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ABSTRACT

This teaching guide was developed to help technical education teachers present courses on computer-assisted drafting (CAD). The guide is aimed at helping students learn to use computers and work with disk operating systems and files at a faster pace. The eight units of instruction include some or all of the following basic components of a unit of instruction: objective sheet, suggested activities for the teacher, answers to assignment sheets, answers to written test, written test, unit evaluation form, teacher supplements, transparency masters, information sheet, assignment sheets, student supplements, and job sheets. Other contents are as follows: information on use of the publication, a competency profile, an instructional review and task analysis, a list of related academic and workplace skills, a list of tools, equipment and materials, and a list of 14 references. The following topics are covered: CAD terms, CAD hardware, parts of a CAD system, disk operating systems, CAD software, types of files, setup, and basic geometric constructions. (KC)

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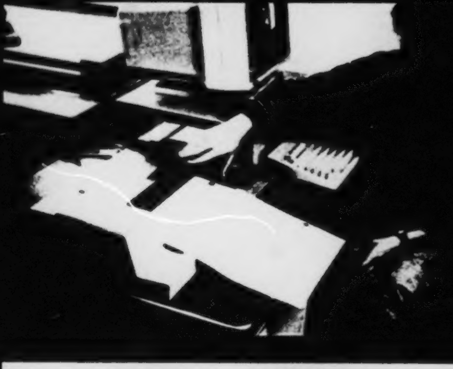

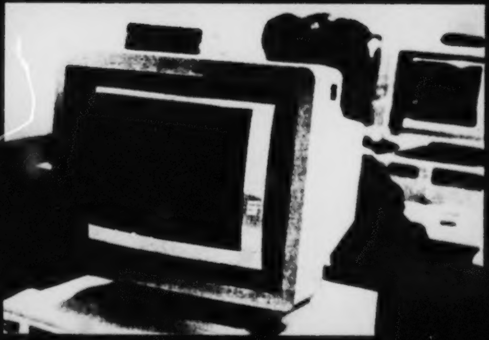

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C:\> DIR
     CAD Software
     CAD Hardware
     Disk Operating Systems
     Directories and Files
     Geometric Constructions
     Other Good Stuff
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MAVCC

Teacher Edition

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The CAD Survival Kit

Teacher Edition

Table of Contents

Foreword v
Acknowledgements vii
Use of introductory materials ix
Use of this publication xi
Academic and workplace skills classification and definitions xv
Competency profile xvii
Instructional/task analysis xxi
Related academic and workplace skills list xxvii
Tools, equipment, and materials list xxxi
References xxxiii

Unit 1: CAD Terms 1

Unit 2: CAD Hardware 15

Unit 3: Parts of a CAD System 23

Unit 4: Disk Operating Systems 39

Unit 5: CAD Software 57

Unit 6: Types of Files 69

Unit 7: Setup 75

Unit 8: Basic Geometric Constructions 89

Disclaimer

This text is designed to present comparative operating information about hardware and software used for Computer Aided Drafting. Materials in the text are intended for presentation by an experienced instructor in a classroom/lab environment designed for the safety of students and equipment. Because process and product vary with local implementation, the author and publisher disclaim all liability for the use of these materials beyond the intended purpose of demonstration.

Foreword

The CAD Survival Kit was suggested and designed by the instructional/task committee which met to plan the revision of MAVCC's drafting series. Since the series, including basic, mechanical, pipe, and electronic drafting, will be CAD texts, the committee wanted students to have a high-tech introduction to the CAD environment. And the CAD environment is what *The CAD Survival Kit* is all about. Many students enter CAD programs with both skills and motivation, but the lack of computer know-how and the ability to work with disk operating systems and files can become an impediment to acquiring faster, better skills. *The CAD Survival Kit* will help beginners move at a faster pace, and even help advanced students operate more productively in the CAD environment.

MAVCC feels this text will not only be a superb learning vehicle, it will serve as a valuable reference for advanced CAD students, and even instructors. The drawings in the text are all CAD generated, and the final unit about "geometric constructions" could well be a course within itself.

As you use these instructional materials, we hope you find they contribute to the quality of your program. Every effort has been made to make these materials readable, and by all means useable. You as an instructor will need to develop instructional strategies for localizing, individualizing, and supplementing the text. Most of all, you will need to motivate the students who use the materials.

As always, MAVCC appreciates hearing from people who use our publications. Please write or call MAVCC and share your opinions about *The CAD Survival Kit*. Tell us what you liked and/or what you think needs to be changed. We want to hear from you.

Mervin Birdwell, Chairman
Board of Directors
Mid-America Vocational
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A special thank you goes to the manufacturers and designers of the hardware and software that make CAD systems work. Their procedures and graphics are referenced in many places in *The CAD Survival Kit*, and their contributions have greatly enhanced this text.

To the Oklahoma Department of Vocational and Technical Education, a special thank you to the personnel in word processing, art, and the print shop for their help with development and printing. Their contributions have been significant.

Use of Introductory Materials

Introductory materials are included in the teacher guide only and contain useful information to assist administrators and teachers in planning for instruction.

In addition to the general information such as the table of contents, foreword, and acknowledgements page, information is included on the following:

1. **Use of this publication**—Explains the components of a unit of instruction and how they should be used as part of the teaching/ learning process.

2. **Competency profile**—Provides a record of student performance for each task included in a unit of instruction. This becomes a part of the student's permanent records and should be utilized when directing the student toward employment opportunities.

3. **Instructional/task analysis**—Provides a quick review of contents of the publication: identifies cognitive (knowledge) skills and psychomotor (doing) skills addressed in each unit of instruction.

4. **Related academic and workplace skills list**—Classifies unit tasks (assignment sheets and job sheets) according to related academic and workplace skills being reinforced. Skill areas reflected by skill groups, sub skills, and descriptions have been identified using *Workplace Basics: The Skills Employers Want*, developed by the American Society for Training and Development (ASTD) and the U.S. Department of Labor and adapted by MAVCC.

5. **Tools, equipment, and materials list**—Provides a comprehensive list of those items needed to successfully complete the assignment sheets and/or job sheets; assists administrator/teacher in determining program costs.

6. **Reference list**—Provides a comprehensive list of resources used in the development of this publication.

A glossary of terms may also be provided in the introductory materials depending on subject matter and committee recommendations.

As you use these materials, it is hoped that they will provide useful information to meet a variety of needs.

Use of This Publication

Instructional units

The CAD Survival Kit contains eight units of instruction. Each instructional unit in a teacher guide includes some or all of the following basic components of a unit of instruction: objective sheet, suggested activities for the teacher, answers to assignment sheets, answers to written test, written test, unit evaluation form, teacher supplements, transparency masters, information sheet, assignment sheets, student supplements, and job sheets.

All of the unit components focus on measurable and observable learning outcomes. Teachers are encouraged to supplement, personalize, localize, and motivate with these materials in order to develop a complete teaching/learning process.

Units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the teacher will help to determine the following:

- Amount of materials that can be covered in each class period.
- Skills that must be demonstrated.
- Amount of class time needed for demonstrations.
- Amount of time needed for student practice.
- Supplementary materials, including print and nonprint media and equipment and supplies, that must be ordered.
- Resource people who must be contacted.

Objective sheet (Color code: White)

Each unit of instruction is based on performance objectives which state the goals for successful completion of the course. These performance objectives are stated in two forms: unit objectives which state the expected performance of each student after completion of the unit of instruction, and specific objectives which state what the student must do to reach the unit objective.

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods. Teachers should prepare for each unit by deciding how each objective can best be taught.

Teachers should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the teacher should remember to supply the needed information, assignment and/or job sheets, and criterion test items.

Suggested activities (Color code: Pink)

This component is included only in the teacher guide. The suggested activities assist teachers during the preparation stage of the teaching/learning process by providing an instructional plan, teaching suggestions, and a list of supplemental resources. Ways to integrate academic and workplace skills have been included in the teacher suggestions, and skill areas have been noted in bold. (A table of academic and workplace skills with accompanying definitions has been provided on page xv.) The teacher should read the suggested activities before teaching the units and decide how each objective can best be taught. Time should also be allowed to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the teacher will vary according to the particular unit.

References used in the development of each unit are listed in the suggested-activities section, along with suggested supplemental resources that may be used to teach the unit. These materials can be used by the teacher to supplement her or his knowledge of the subject area or to help students with particular interests or objectives in the area covered.

Instructions for evaluating student performance on the job sheets are also included in the suggested-activities section. Teachers should select and discuss with students the rating scale that will be used.

Assignment and written test answers (Color code: Pink)

Assignment-sheet answers and written-test answers are designed to assist the teacher in evaluation of student performances.

Written test (Color code: Yellow)

This component provides criterion-referenced evaluation of every cognitive objective listed in the unit of instruction. The test appears in the teacher guide only, but duplication is permitted for student use. If objectives have been added, deleted, or modified, appropriate changes should be made on the written test. It is recommended that the tests be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered. A selection of test items from the units covered may be used for final tests at the end of each term if desired.

Unit evaluation form (Color code: White)

This sheet provides teachers with a record of each students performance on a unit of instruction. It includes space for assignment sheet ratings, job sheet ratings, written test scores, and teacher comments. The unit evaluation form is included in the teacher guide only, but may be duplicated.

Use of This Publication

Teacher supplements (Color code: White)

This component is included only in the teacher guide. Teacher supplements are optional materials for the teacher to use. They have three purposes: to provide the teacher with higher level materials to stretch the advanced student, with remedial information or practice to assist the less-advanced student, and with state-of-the-art information in which the teacher may not have background or with information that is not readily available in other books. Some teacher supplements may be duplicated for student use and are marked accordingly.

Transparency masters (Color code: White)

Transparencies are included in the teacher guide only and are used to direct the students' attention to the topic of discussion. They may provide illustrations, charts, schematics, or additional information needed to clarify and reinforce objectives included in the unit of instruction.

Information sheet (Color code: Green)

The information sheet provides the content essential for meeting the cognitive (knowledge) objectives of the unit. Teachers will find that the information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. Students should read the information sheet before the information is discussed in class. Space is provided in margins for students and teachers to add notes that supplement, localize, personalize, or provide information for the teaching of each objective.

Student supplements (Color code: White)

Student supplements are included in the student manual. The information presented in a student supplement may consist of tables, charts, written information, forms, or other information students will need in order to complete one or more of the assignment and/or job sheets. Students are not directly tested over the information presented in a supplement; however, their ability to apply this information may be evaluated in the completion of assignment sheets or job sheets.

Assignment sheets (Color code: Tan)

Assignment sheets provide students with pencil and paper activities that give students the opportunity to make practical application of the knowledge in the information sheet. Criteria are provided to objectively evaluate student performance.

Job sheets (Color code: Blue)

The job sheets provide criteria to objectively evaluate student performance, a list of required equipment and materials, and a step-by-step procedure for performing a psychomotor skill. The teacher should discuss the equipment and materials available in the classroom and/or laboratory and demonstrate the procedure prior to having students practice procedure. When a student is ready to be evaluated, the teacher should follow instructions for evaluating student performance which may be found in the teacher guide.

Job sheets are an important segment of each unit. Job sheets provide potential employers with a picture of the skills being taught during training and the performances that might reasonably be expected from an individual who has had this training.

Disseminating material

Material may be given out a unit or page at a time to keep the material before the student always new. Some teachers ask students to furnish a three-ring binder or folder for the current unit of study. This is convenient for students taking the material home to study. Upon completion, each unit is then placed in a larger binder. Some teachers prefer to store the material by unit in filing cabinets or boxes until needed.

For best results, provide student materials for each student. Student manuals contain objective sheets, information sheets, student supplements, assignment sheets, and job sheets. Students should be allowed to take their materials home at the end of the course.

Academic and Workplace Skills
(Classifications and Definitions)

Skill Groups	Sub Skills	Definitions
Learning Skills	Learning to learn	Developing ability to apply knowledge to other situations: knowing how to learn.
Foundation Skills	Reading	Comprehending written information and analyzing, summarizing, and applying what has been read to a specific task.
	Writing	Communicating a thought, idea or fact in written form in a clear, concise manner.
	Math	Applying computation skills such as reasoning, estimation, and problem solving as they are actually used on the job.
	Science	Applying knowledge learned through study or practice that is based on scientific principles as they relate to specific tasks.
Communication Skills	Listening	Listening for content, conversation, long-term contexts, emotional meaning, and directions.
	Oral communication	Communicating a thought, idea, or fact in spoken form in a clear, concise manner.
Adaptability Skills	Creative thinking	Using imagination to create something new—i.e. an idea, invention, work of art.
	Problem solving (critical thinking)	Recognizing and defining problems, inventing, and implementing solutions, and tracking and evaluating results.
Personal Management Skills	Self-esteem	Developing self-confidence and creating a positive self-image.
	Motivation/goal setting	Setting and meeting defined goals and objectives.
	Personal and career development	Emphasizing self-direction by establishing and implementing a plan.
Group Effectiveness Skills	Interpersonal relations	Developing ability to maintain positive relations with others.
	Negotiation	Resolving conflict between two or more individuals.
	Teamwork	Working together in a group to reach a common goal.
Influence Skills	Organizational effectiveness	Adapting to the organization's goals, values, culture, and traditional modes of operation.
	Leadership	Directing/influencing group in performance of a specific task; accepting responsibility for others.

The CAD Survival Kit

Competency Profile

Name: ____________________________________

Directions: Evaluate the student using the rating scale below. Write the appropriate number to indicate the degree of competency achieved. The descriptions associated with each of the numbers focused on a level of student performance for each of the tasks listed. The written test scoreline is provided for optional teacher use. It may not be applicable in all cases.

Option A

Rating scale:
4 - Skilled - Can perform job with no additional training.
3 - Moderately Skilled - Has performed job during training program; limited additional training may be required.
2 - Limited Skill - Has performed job during training program; additional training is required to develop skill.
1 - Unskilled - Is familiar with process, but is unable to perform job.
0 - No Exposure - No information or practice provided during training program, complete training required.
NA - Non-applicable.

Option B

Yes - Can perform with no additional training
No - Is unable to perform satisfactorily

Unit 1: CAD Terms

_______1. Convert CAD terms to acronyms
_______2. Convert acronyms to CAD terms.
_______3. Convert bytes, kilobytes, and megabytes to selected storage formats.
_______4. ____

______Written Test Score

Unit 2: CAD Hardware

_______1. Sketch CAD hardware and identify each part.
_______2. ____

______Written Test Score

Unit 3: Part of a CAD System

_______1. Identify external parts of a CAD system.
_______2. Sketch and identify internal parts of a microcomputer.
_______3. Identify type, size, and capacity of selected disks.
_______4. ____

______Written Test Score

Unit 4: Disk Operating Systems

______1. Format a floppy disk.
______2. Make directories on a floppy disk.
______3. Create a batch file using the Edit command.
______4. Delete files and directories from a floppy disk.
______5. ____

______Written Test Score

Unit 5: CAD Software

______1. Create a boot DOS disk.
______2. Boot an operating system.
______3. Run a DOS utility program.
______4. ____

______Written Test Score

Unit 6: Types of Files

______1. Correct file type extensions.
______2. ____

______Written Test Score

Unit 7: Setup

______1. Compile information needed to create a default drawing.
______2. ____

______Written Test Score

Unit 8: Basic Geometric Constructions

______1. Sketch and dimension principal views of a part.
______2. Draw with drawing instruments the geometric construction of a rocker arm.
______3. Draw with drawing instruments the geometric construction of a shift lever.
______4. Sketch selected entities.
______5. Sketch the editing of selected entities.
______6. Figure the absolute coordinates of a V-block.
______7. Figure the relative and polar coordinates of a gasket.
______8. ____

______Written Test Score

COMMENTS: ______________________________

Evaluator: ______________________ Date: ______________

* Permission to duplicate this profile is granted.

The CAD Survival Kit

Instructional/Task Analysis

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 1: CAD Terms

1. Terms and definitions
2. CAD applications and their objectives
3. Other CAD applications and their objectives
4. Functions of ROM in a CAD/CAM system
5. Functions of RAM in a CAD/CAM system
6. How to measure storage capacity in kilobytes and megabytes
7. Hardware and software requirements for a CAD system
8. Types of CAD systems and their characteristics
9. DOS and its uses in a CAD system
10. Files and their importance in a CAD system
11. Advantages of CAD/CAM systems

12. Convert CAD terms to acronyms. (Assignment Sheet 1)
13. Convert Acronyms to CAD terms. (Assignment Sheet 2)
14. Convert bytes, kilobytes, and megabytes to selected storage formats. (Assignment Sheet 3)

Unit 2: CAD Hardware

1. Terms and definitions
2. The functions of input devices
3. The functions of output devices
4. Memory devices and their uses in a computer system
5. Other CAD devices for CAD systems

6. Sketch CAD hardware and identify each part. (Assignment Sheet 1)

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 3: Parts of a CAD System

1. Terms and definitions
2. Components of a CAD system
3. CAD system printers and their characteristics
4. CAD plotters and their characteristics
5. Basic elements of a microcomputer
6. Types of computer ports and power connections
7. Graphic display cards and their characteristics
8. Floppy drives and disks and their characteristics
9. Hard drives and their characteristics
10. Disk controller cards and their characteristics
11. Network cards and their characteristics
12. Power supplies and their characteristics

13. Identify external parts of a CAD system. (Assignment Sheet 1)
14. Sketch and identify internal parts of a microcomputer. (Assignment Sheet 2)
15. Identify type, size, and capacity of selected disks. (Assignment Sheet 3)

Unit 4: Disk Operating Systems

1. Terms and definitions
2. Guidelines for accessing directories
3. Guidelines for formatting floppies and microdisks
4. Guideline for checking a disk
5. Guidelines for making a batch file
6. Deleting a file or files

9. Format a floppy disk. (Assignment Sheet 1)
10. Make directories on a floppy disk. (Assignment Sheet 2)
11. Create a batch file using the Edit command. (Assignment Sheet 3)
12. Delete files and directories from a floppy disk. (Assignment Sheet 4)

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

7. The guideline for renaming a file
8. DOS commands and their functions

Unit 5: CAD Software

1. Terms and definitions
2. Operational software and its functions
3. Parts and functions of a window environment
4. Third party utility software and its uses
5. Microcomputer applications software
6. Create a boot DOS disk. (Assignment Sheet 1)
7. Boot an operating system. (Assignment Sheet 2)

Unit 6: Types of Files

1. Terms and definitions
2. Extensions used in a DOS environment
3. Extensions and their CAD system applications
4. Extensions for specialized files and their applications
5. Correct file type extensions. (Assignment Sheet 1)

Unit 7: Setup

1. Terms and definitions
2. Guidelines for creating a default drawing
3. Steps in creating a default drawing
4. Compile information needed to create a default drawing. (Assignment Sheet 1)

Unit 8: Basic Geometric Constructions

1. Terms and definitions
2. Entities and their applications in geometric construction
6. Sketch and dimension principal views of a part. (Assignment Sheet 1)

Related Information: What the Student Should Know

3. Editing entities and their uses in geometric construction
4. Techniques for inputting coordinates
5. Geometric construction techniques

Application: What the Student Should Be Able to Do

7. Draw with drawing instruments the geometric construction of a rocker arm. (Assignment Sheet 2)
8. Draw with drawing instruments the geometric constructions of a shift lever. (Assignment Sheet 3)
9. Sketch selected entities. (Assignment Sheet 3)
10. Sketch the editing of selected entities. (Assignment Sheet 5)
11. Figure the absolute coordinates of a V-block. (Assignment Sheet 6)
12. Figure the relative and polar coordinates of a gasket. (Assignment Sheet 7)

Related Academic and Workplace Skills
For (*The CAD Survival Kit*)

Task	Skill Group	Sub Skill	Description
Unit 1: CAD Terms			
Convert CAD terms to acronyms. (A. S. 1)	Foundation Skills	Reading	Comprehends written information and applies it to a task
Convert acronyms to CAD terms. (A. S. 2)	Foundation Skills	Reading	Comprehends written information and applies it to a task
Convert bytes, kilobytes, and megabytes to selected storage formats. (A. S. 3)	Foundation Skills	Math	Applies computation skills to solve a problem
Unit 2: CAD Hardware			
Sketch CAD hardware and identify each part (A. S. 1)	Adaptability Skills	Problem Solving	Recognizes elements of a task and implements a solution
Unit 3: Parts of a CAD System			
Identify external parts of a CAD system (A. S. 1)	Adaptability Skills	Problem Solving	Recognizes elements of a task and implements a solution
Sketch and identify internal parts of a microcomputer (A. S. 2)	Adaptability Skills	Problem Solving	Recognizes elements of a task and implements a solution
Identify type, size, and capacity of selected disks. (A. S. 3)	Foundation Skills	Math	Applies computation skills to solve a problem
Unit 4: Disk Operating Systems			
Format a floppy disk. (A. S. 1)	Foundation Skills	Science	Applies knowledge learned through study to complete a practical task
Make directories on a floppy disk. (A. S. 2)	Foundation Skills	Science	Applies knowledge learned through study to complete a practical task
Create a batch file using the Edit command. (A. S. 3)	Foundation Skills	Science	Applies knowledge learned through study to complete a practical task
Delete files and directories from a floppy disk. (A. S. 4)	Foundation Skills	Science	Applies knowledge learned through study to complete a practical task

Unit 5: CAD Software

Create a boot DOS disk. (A. S. 1)	Foundation Skills	Science	Applies knowledge learned through study to complete a practical task
Boot an operating system. (A. S. 2)	Foundation Skills	Science	Applies knowledge learned through study to complete a practical task
Run a DOS utility program. (A. S. 3)	Foundation Skills	Science	Applies knowledge learned through study to complete a practical task

Unit 6: Types of Files

Correct file type extensions. (A. S. 1)	Foundation Skills	Science	Applies knowledge learned through study to complete a practical task

Unit 7: Setup

Compile information needed to create a default drawing. (A. S. 1)	Foundation Skills	Writing	Communicates in writing information needed for a project

Unit 8: Geometric Constructions

Sketch and dimension principal parts of a view. (A. S. 1)	Foundation Skills	Math	Applies drafting techniques with computations to create a drawing
Draw with drawing instruments the geometric construction of a rocker arm. (A. S. 2)	Foundation Skills	Math	Applies drafting techniques with computations to create a drawing
Draw with drawing instruments the geometric construction of a shift lever. (A. S. 3)	Foundation Skills	Math	Applies drafting techniques with computation to create a drawing
Sketch selected entities. (A. S. 4)	Foundation Skills	Reading	Comprehends written directions to complete a drafting technique
Sketch the editing of selected entities. (A. S. 5)	Foundation Skills	Reading	Comprehends written directions to complete a drafting technique
Figure the absolute coordinates of a V-block. (A. S. 6)	Foundation Skills	Math	Applies computation skills to determine coordinates in a drawing
Figure relative and polar coordinates of a gasket. (A. S. 7)	Foundation Skills	Math	Applies computation skills to determine coordinates in a drawing

The CAD Survival Kit

Tools, Equipment, and Materials List

Hardware

- Computer, IBM compatible
- Monitor
- Keyboard
- Mouse or graphics tablet with mouse
- Printer
- Plotter

Software

- DOS, Version 5 or later
- Utility software as available

Basic Drafting Instruments

- Scales
- Triangles
- Compass
- T-square or drafting machine
- Drafting pencils
- Eraser

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CAD Terms
Unit 1

Objective Sheet

Unit Objective

After completing this unit, the student should be able to define CAD terms and calculate CAD system storage capacities. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to CAD with their correct definitions.
2. Match basic CAD applications with their objectives.
3. Select true statements about other CAD applications and their objectives.
4. Complete statements about the functions of ROM in a CAD/CAM system.
5. Complete statements about the functions of RAM in a CAD/CAM system.
6. Solve problems about how to measure storage capacity in kilobytes and megabytes.
7. Complete statements about hardware and software requirements for a CAD system.
8. Match types of CAD systems with their characteristics.
9. Select true statements about DOS and its uses in a CAD system.
10. Complete statements about files and their importance in a CAD system.
11. Select true statements about advantages of CAD/CAM systems.
12. Convert CAD terms to acronyms. (Assignment Sheet 1)
13. Convert acronyms to CAD terms. (Assignment Sheet 2)
14. Convert bytes, kilobytes, and megabytes to selected storage formats. (Assignment Sheet 3)

CAD Terms
Unit 1

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction or individual learning activities. Study the specific objectives to determine the order in which you will present the objectives.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for enrichment of exceptional students as well as accommodation of special needs students.

4. Make transparencies from transparency masters included with this unit. These appear in the teacher guide only and are designed to be used with the following objectives:

   TM 1—CAD System (Objective 7)
   TM 2—Menu-Driven and Command Driven Systems (Objective 8)
   TM 3—Directories, Subdirectories, and Files (Objective 10)

5. Develop teaching plan. Adjust for different learning styles.

6. Make copies of Unit Evaluation Form.

Delivery and Application

7. Provide students with unit of instruction.

8. Discuss unit and specific objectives.

9. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic skills when applicable.

10. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Evaluation

11. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

12. Make copies of the written test. Add or modify test items as needed.

13. Give written test.

Suggested Activities

14. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments.

15. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Introduce the unit by discussing the importance of CAD terms in communicating with fellow employees. Skill areas: **Communication skills, oral communication**.

2. Explain the use of acronyms as short cuts in communications. Skill ares: **Communication skills, oral communication**.

3. Collect examples of acronyms used in the aircraft industry, automotive industry, electronics industry and others. This may be done individually or as a group activity. Skill areas: **Group effectiveness skills, teamwork**.

4. Use Transparency 1 to discuss a CAD workstation, pointing out monitor, computer, Mouse, graphics tablet, printer, and plotter. Skill areas: **Communication skills, listening**.

5. Use Transparency 2 to discuss a command driven and a menu driven system. Skill areas: **Communication skills, listening**.

6. Use Transparency 3 to discuss directories and files. Skill areas: **Communication skills, listening**.

Resources Used in Developing This Unit

1. Forsythe, Steven G. *An Introduction to IBM DOS (MS-DOS/PC-DOS).* Brea, CA: Brookside Publishing Company, 1991.

2. Stultz, Russell A. *Illustrated MS/PC-DOS.* Plano, TX: Worldwide Publishing, Inc., 1988.

3. Schildt, Herb. *Mastering DOS.* Lake Forest, IL: Macmillan/McGraw-Hill, 1992.

4. Giesecke, Frederick E., et. al. *Technical Drawing.* New York: Macmillan Publishing Co., Inc., 1991.

5. Williams, Ric. *Increasing Your Productivity DOS.* Lake Forest, IL: Macmillan/McGraw-Hill, 1992.

CAD Terms
Unit 1

Answers to Assignment Sheets

Assignment Sheet 1

1. CAD
2. CAD
3. CADD
4. CAM
5. CAD/CAM
6. CAE
7. RAM
8. ROM

Assignment Sheet 2

1. a. Computer Aided Drafting
   b. Computer Aided Design
2. Computer Aided Design and Drafting
3. Computer Aided Manufacturing
4. Computer Aided Design/Computer Aided Manufacturing
5. Computer Aided Engineering
6. Random Access Memory
7. Read Only Memory

Assignment Sheet 3

1. 720,000 bytes
2. 1,440,000 bytes
3. 2,000,000 bytes
4. 360,000 bytes
5. 1,200,000 bytes
6. 11,616K
7. 3.5MB
8. 80MB
9. 29K
10. 345K

CAD Terms
Unit 1

Answers to Written Test

1. a. 8
   b. 6
   c. 1
   d. 9
   e. 7
   f. 4
   g. 2
   h. 5
   i. 3

2. a. 3
   b. 1
   c. 2

3. a, b, c

4. a. A system
   b. Permanent
   c. Permanent
   d. Disk operating system

5. a. Stored
   b. Lost
   c. Programs, programs

6. a. 2
   b. 2

7. a. Physical
   b. Physical
   c. Computer programs
   d. Games

8. a

9. a, c, d

10. a. Material
    b. Directory
    c. Directories
    d. "Setup file"
    e. DIR

11. a, b

CAD Terms
Unit 1

Written Test

Name ______________________________ Date __________________ Score ____________

1. Match the terms on the right with their correct definitions.

______a. A word or words formed from the first letters or first syllables of two or more words

______b. American Standard Code for Information Interchange

______c. Computer Aided Drafting or Computer Aided Design

______d. Computer Aided Design and Drafting

______e. Computer Aided Manufacturing

______f. Computer Aided Design/Computer Aided Manufacturing

______g. Computer Aided Engineering

______h. A general term used to classify computer images generated for engineering drawings, animation, graphs and charts, architectural drawings, interior design, and other areas requiring drawings

______i. The equipment and work area used by a CAD operator for CAD/CAM operations

1. CAD
2. CAE
3. Workstation
4. CAD/CAM
5. Computer graphics
6. ASCII
7. CAM
8. Acronym
9. CADD

Written Test

2. Match basic CAD applications with their objectives. Place the number of the application in the blank beside the proper description.

______a. In this process, a CAD operator is responsible for drafting what an engineer designs, and uses a computer system to assist in the creation, modification, documentation, and display of a drawing.

______b. In this process, a CAD operator is responsible for all or some of a design and is under the guidance of a design engineer while using a computer system for design creation, modification, and display of a drawing.

______c. In this process a CAD operator is responsible for design and drafting under the guidance of a design engineer.

1. Computer Aided Design
2. Computer Aided Design and Drafting
3. Computer Aided Drafting

3. Select true statements about other CAD applications and their objectives. Place an "X" beside each true statement.

______a. Computer Aided Manufacturing (CAM) uses computer and digital information to control or assist in all or part of a manufacturing process.

______b. CAM applications included numerically controlled machines, process planning, robotics, programmable logic controllers, and quality control.

______c. The combination of Computer Aided Design/Computer Aided Manufacturing integrates design and manufacturing by using a common data base to complete a manufacturing cycle from the basic idea to the finished product.

______d. Computer Aided Engineering is just a drafting computer system.

______e. In CAE, a CAD operator performs all of the analysis functions.

Written Test

4. Complete statements about the functions of ROM in a CAD/CAM system. Circle the information that best completes each of the following statements.

   a. ROM stands for Read Only Memory; ROM contains the instructions required to boot (**a system**) (**a mouse**) up when a computer is turned on.

   b. ROM is (**permanent**) (**temporary**) memory that performs instructions which permit the operating system to be copied form auxiliary storage into RAM.

   c. Because ROM is (**temporary**) (**permanent**) memory, it cannot be reprogrammed or otherwise altered by an operator.

   d. ROM (**checks**) (**deletes**) each component in RAM.

5. Complete statements about the functions of RAM in a CAD/CAM system. Circle the information that best completes each of the following statements.

   a. RAM stands for Random Access Memory and serves as the main memory read/write storage unit that provides an operator with direct access to information that has been (**lost**) (**stored**).

   b. RAM is temporary, not permanent memory, and all data entered in RAM must be saved before a computer is turned off or the entries in RAM will be (**transferred to ROM**) (**lost**).

   c. RAM stores two things: file data and (**disk**) (**programs**), and file data comprises the output of (**programs**) (**processes**) that are loaded and run from RAM.

6. Solve problems about how to measure storage capacity with kilobytes and megabytes. Circle the number of the information that best solves each of the following problems.

   a. Another student in your class is using the figure 1,024 to calculate the storage capacity on a 360K floppy disk. To help the student, you should:

      (1) Find your friend a hand-held calculator.
      (2) Tell your friend to round the figure off at 1,000.
      (3) Help your friend multiply to get the exact answer.

   b. You've been assigned to calculate the approximate amount of storage available on a 1.44MB floppy disk. You should:

      (1) Work with the rounded off figure of 1,000.
      (2) Work with the rounded off figure of 1,000,000.
      (3) Round off the 1.44 to 1.5 to make multiplication easier.

Written Test

7. Complete statements about hardware and software requirements for a CAD system. Circle the information that best completes each of the following statements.

   a. The (**mechanical**) (**physical**) devices that are linked together to form a CAD system are referred to as hardware.

   b. (**Physical**) (**Software**) devices in a CAD system include the computer, monitor, mouse, keyboard, graphics tablet, printer, and plotter.

   c. The electronically coded data in the form of (**hard disks**) (**computer programs**), data, and operating systems that are loaded into computer RAM are referred to as software.

   d. Software is executed or run by the computer, and types of software range from wordprocessing and data bases to (**tablets**) (**games**) and educational programs.

8. Differentiate between types of CAD systems and their characteristics. Place an "X" beside the definition of a command driven system.

   ______a. Allows an operator to type in a command word or letter from the keyboard to make the system operate

   ______b. Allows an operator to select from an on-screen menu to make the system operate

9. Select true statements about DOS and its uses in a CAD system. Place an "X" beside each true statement.

   ______a. DOS is the acronym for Disk Operating System, a software program normally loaded onto a hard disk to boot up, operate, and generally manage the computer system.

   ______b. DOS is accessed by using a printer or plotter.

   ______c. DOS commands are easy to understand because many of them are expressed in plain language such as COPY or FORMAT.

   ______d. DOS serves significant functions in a CAD/CAM system because it manages the storage and retrieval of data that is stored in directories and files.

Written Test

10. Complete statements about files and their importance in a CAD system. Circle the information that best completes each of the following statements.

    a. Files contain (**coded material**) (**data**) that has been saved for reference or operational use at a later date.

    b. Files must be properly entered into a (**program**) (**directory**) which keeps related data in proper order so it can be readily accessed for reference, revision, printing, or plotting.

    c. (**Entries**) (**Directories and subdirectories**) must be named so that they provide a path to the locations where individual files are stored.

    d. A file that contains standard information is called a (**"setup file"**) (**"base file"**) and such a file may contain such information as layer, colors, line types, grid on, snap on, limits, etc.

    e. Since several files may be listed under one directory, an operator can access the complete directory by typing (**DIR**) (**DIRECT**), a part of DOS that manages access to directories.

11. Select true statements about the advantages of CAD/CAM systems. Place an "X" beside each true statement.

    ______a. Generally speaking, CAD/CAM systems are faster and more accurate than drafting projects done on a board.

    ______b. An outstanding feature of a CAD system is its capacity to store work that has taken hours, days, or weeks to create so that the work can be readily printed, plotted, or revised as needs dictate.

    ______c. A CAD workstation can replace the need for an operator to have command of basic drafting knowledge such as geometric constructions, and a CAD operator can produce a product with greater ease and greater accuracy, and store and change the work much faster than board changes can be accomplished.

***Permission to duplicate this test is granted.**

CAD Terms
Unit 1

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Convert CAD Terms to Acronyms Rating _____

Comments: ____

____

Assignment Sheet 2—Convert Acronyms to CAD Terms Rating _____

Comments: ____

____

Assignment Sheet 3—Convert Bytes, Kilobytes, and Megabytes to Selected Storage Formats Rating _____

Comments: ____

____

Written Test Scores

Pretest _____ Posttest _____ Other _____

Other ____

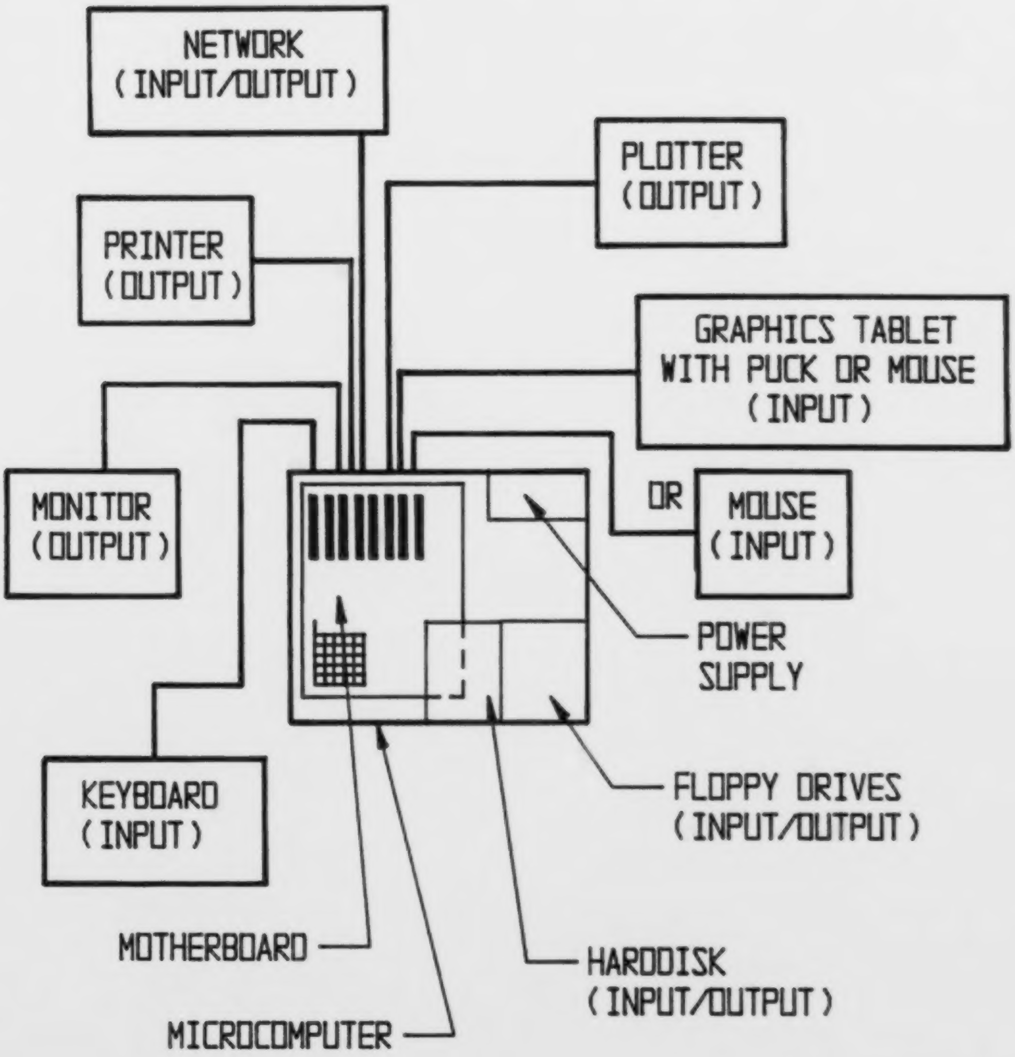
____

Teacher Signature ______________________________ Date __________

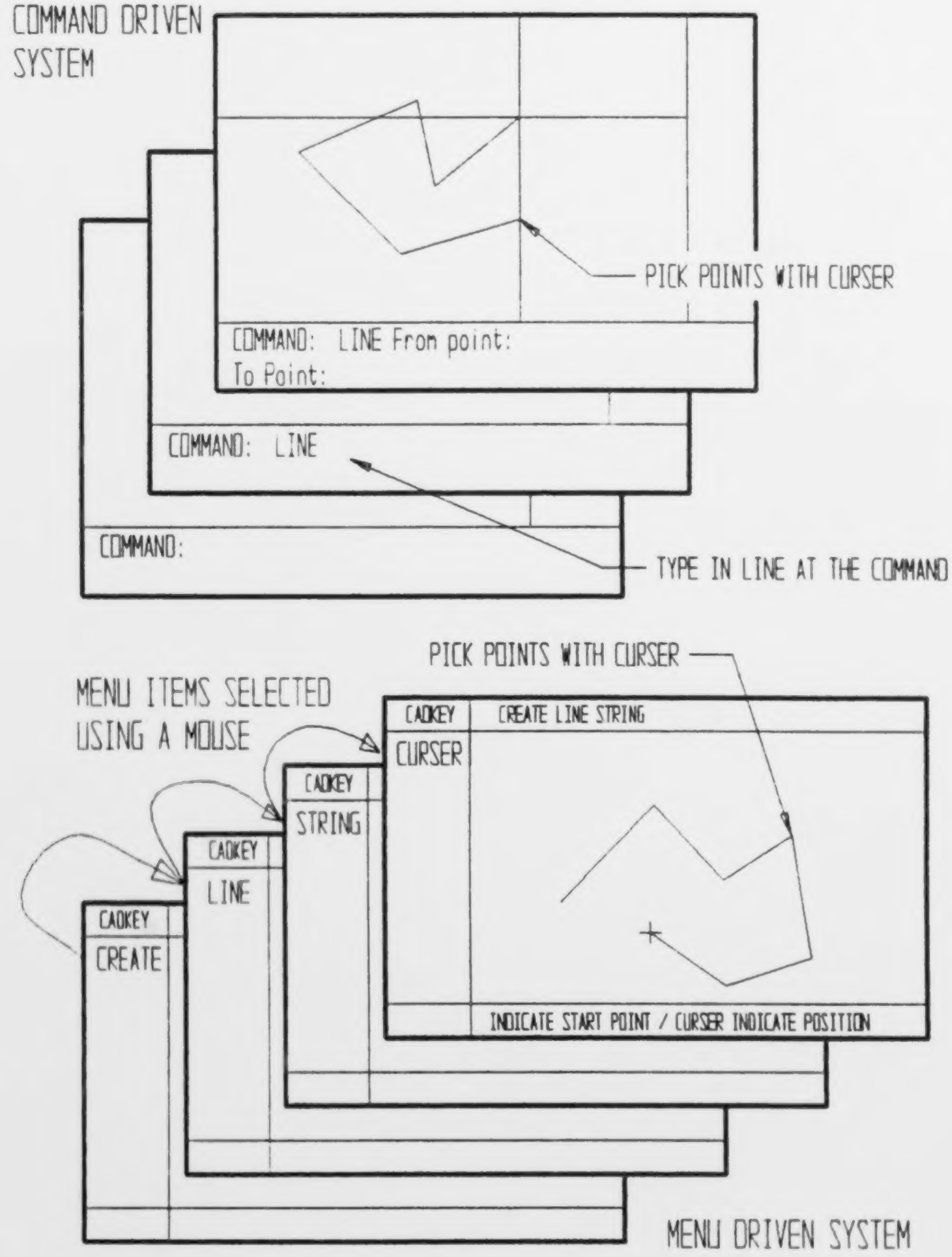
Student Signature ______________________________ Date __________

***Permission to duplicate this form is granted.**

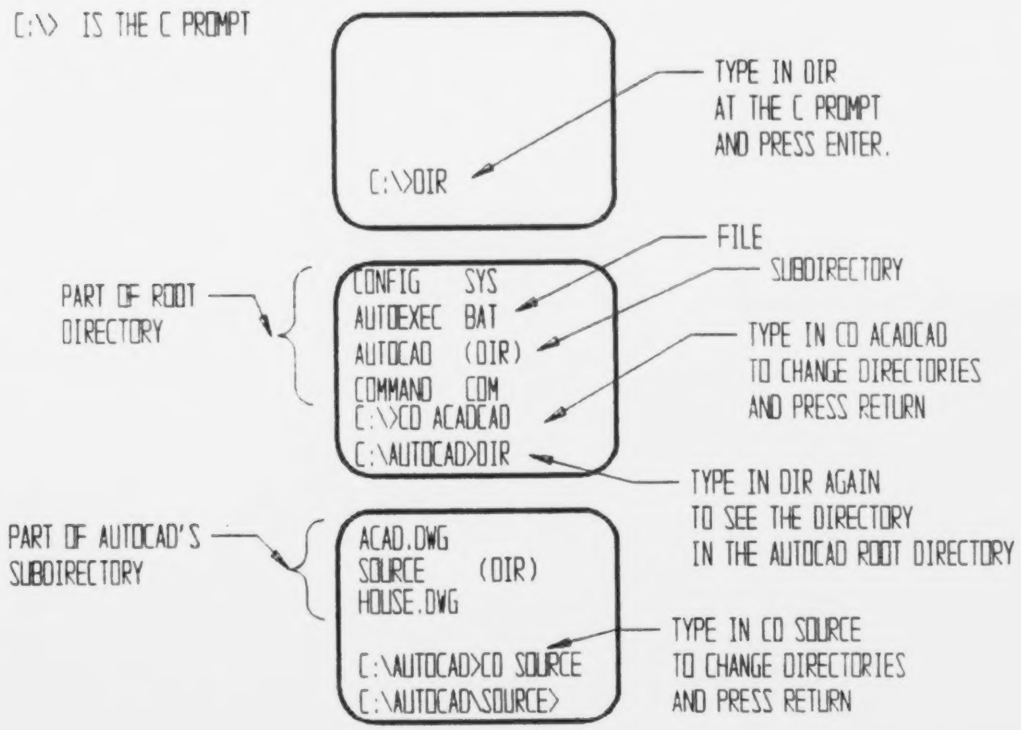
CAD Workstation


NETWORK
(INPUT/OUTPUT)
PLOTTER
(OUTPUT)
PRINTER
(OUTPUT)
GRAPHICS TABLET
WITH PUCK OR MOUSE
(INPUT)
MONITOR
(OUTPUT)
OR
MOUSE
(INPUT)
POWER
SUPPLY
KEYBOARD
(INPUT)
FLOPPY DRIVES
(INPUT/OUTPUT)
MOTHERBOARD
HARDDISK
(INPUT/OUTPUT)
MICROCOMPUTER

Menu-Driven and Command-Driven Systems


COMMAND DRIVEN SYSTEM
PICK POINTS WITH CURSER
COMMAND: LINE From point:
To Point:
COMMAND: LINE
COMMAND:
TYPE IN LINE AT THE COMMAND
PICK POINTS WITH CURSER
MENU ITEMS SELECTED USING A MOUSE
CADKEY
CREATE LINE STRING
CURSER
STRING
LINE
CREATE
INDICATE START POINT / CURSER INDICATE POSITION
MENU DRIVEN SYSTEM

Directories and Files

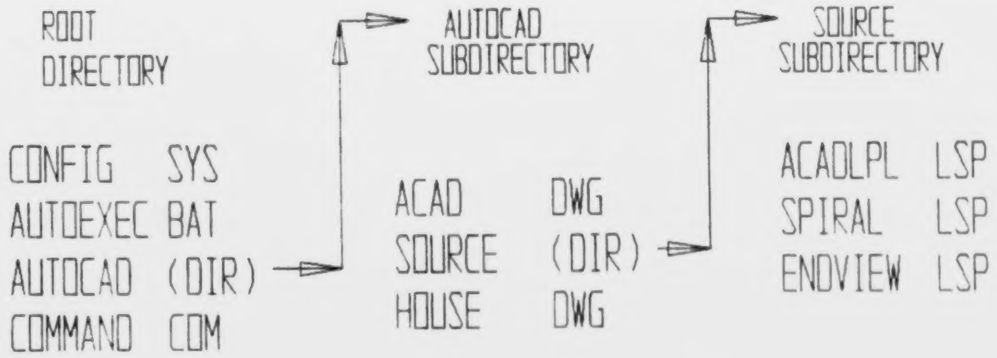

C:\> IS THE C PROMPT
TYPE IN DIR AT THE C PROMPT AND PRESS ENTER.
FILE
SUBDIRECTORY
PART OF ROOT DIRECTORY
TYPE IN CD ACADCAD TO CHANGE DIRECTORIES AND PRESS RETURN
TYPE IN DIR AGAIN TO SEE THE DIRECTORY IN THE AUTOCAD ROOT DIRECTORY
PART OF AUTOCAD'S SUBDIRECTORY
TYPE IN CD SOURCE TO CHANGE DIRECTORIES AND PRESS RETURN

```
C:\>DIR
```

```
CONFIG    SYS
AUTOEXEC  BAT
AUTOCAD   (DIR)
COMMAND   COM
C:\>CD ACADCAD
C:\AUTOCAD>DIR
```

```
ACAD.DWG
SOURCE     (DIR)
HOUSE.DWG

C:\AUTOCAD>CD SOURCE
C:\AUTOCAD\SOURCE>
```


ROOT DIRECTORY
AUTOCAD SUBDIRECTORY
SOURCE SUBDIRECTORY

```
CONFIG    SYS
AUTOEXEC  BAT
AUTOCAD   (DIR)
COMMAND   COM
```

```
ACAD      DWG
SOURCE    (DIR)
HOUSE     DWG
```

```
ACADLPL   LSP
SPIRAL    LSP
ENDVIEW   LSP
```

CAD Terms
Unit 1

Information Sheet

1. **Terms and definitions**

   a. **Acronym** — A word or words formed from the first letters or first syllables of two or more words

   b. **ASCII** — American Standard Code for Information Interchange

   c. **CAD** — Computer Aided Drafting or Computer Aided Design

   d. **CADD** — Computer Aided Design and Drafting

   e. **CAM** — Computer Aided Manufacturing

   f. **CAD/CAM** — Computer Aided Design/Computer Aided Manufacturing

   g. **CAE** — Computer Aided Engineering

   h. **Computer graphics** — A general term used to classify computer images generated for engineering drawings, animation, graphs and charts, architectural drawings, interior design, and other areas requiring drawings

   i. **Workstation** — The equipment and work area used by a CAD operator for CAD/CAM operations

2. **Basic CAD applications and their objectives**

   a. **Computer Aided Drafting** — In this process, a CAD operator is responsible for drafting what an engineer designs, and uses a computer system to assist in the creation, modification, documentation, and display of a drawing.

   b. **Computer Aided Design** — In this process, a CAD operator is responsible for all or some of a design and is under the guidance of a design engineer while using a computer system for design creation, modification, and display of a drawing.

   c. **Computer Aided Design and Drafting** — In this process a CAD operator is responsible for design and drafting under the guidance of a design engineer.

Information Sheet

3. Other CAD applications and their objectives

a. Computer Aided Manufacturing (CAM) uses computer and digital information to control or assist in all or part of a manufacturing process.

b. CAM applications included numerically controlled machines, process planning, robotics, programmable logic controllers, and quality control.

c. The combination of Computer Aided Design/Computer Aided Manufacturing integrates design and manufacturing by using a common data base to complete a manufacturing cycle from the basic idea to the finished product.

d. Computer Aided Engineering uses a wire frame or solid geometry created in a CAD design to analyze a product.

e. In CAE, a CAD operator may perform some of the analysis functions, and an engineer interprets the results.

Example: Common analysis functions include error checking, interference checking for assembly, optimizing manufacturability, performance, economy, loads, vibration, noise, service life, and finite element analysis.

4. The functions of ROM in a CAD/CAM system

a. ROM stands for Read Only Memory; ROM contains the instructions required to boot a system up when a computer is turned on.

b. ROM is permanent memory that performs instructions which permit the operating system to be copied form auxiliary storage into RAM.

c. Because ROM is permanent memory, it cannot be reprogrammed or otherwise altered by an operator.

d. ROM checks that each component of RAM is working properly.

5. The functions of RAM in a CAD/CAM system

a. RAM stands for Random Access Memory and serves as the main memory read/write storage unit that provides an operator with direct access to information that has been stored.

b. RAM is temporary, not permanent memory, and all data entered in RAM must be saved before a computer is turned off or the entries in RAM will be lost.

c. RAM stores two things: file data and programs, and file data comprises the output of programs that are loaded and run from RAM.

Example: AutoCAD is the name of a software program loaded in RAM and the drawing produced is the output in the form of file data. (File Name: FLORPLAN.DWG)

Information Sheet

6. How to measure storage capacity with kilobytes and megabytes

a. Lines, circles, and other graphic entries require significant amounts of memory, and keeping track of memory used and memory available is an important part of a CAD operator's job.

b. The common unit of storage is called a byte, a unit that holds the equivalent of a single character.

c. Since CAD operations require great amounts of memory, its faster and easier to think of memory in kilobytes or megabytes.

d. One kilobyte equals 1,024 bytes and is noted as 1K, but instead of using the figure 1,024 the 1K is usually round off to 1,000 to make it easy to calculate an approximate number of bytes.

Example: A 360K floppy disk has room for 368,640 bytes (360 × 1,024 = 368,640), but rounding off the calculation with the 1K reference gives 360,000 bytes, and this is an acceptable approximation.

e. One megabyte equals 1,048,576 bytes and is noted at 1MB, but instead of the figure 1,048,576, the 1MB is usually rounded off to 1,000,000 to make it easy to calculate an approximate number of bytes.

Example: A 1.44MB floppy disk has room for 1,509,949.44 bytes (1.44 × 1,048,576 = 1,509,949.44) but rounding off the calculation with the 1MB reference gives 1,440,000 bytes, and this is an acceptable approximation.

7. Hardware and software requirements for a CAD system

a. The physical devices that are linked together to form a CAD system are referred to as hardware.

Information Sheet

b. Physical devices in a CAD system include the computer, monitor, mouse, keyboard, graphics tablet, printer, and plotter.

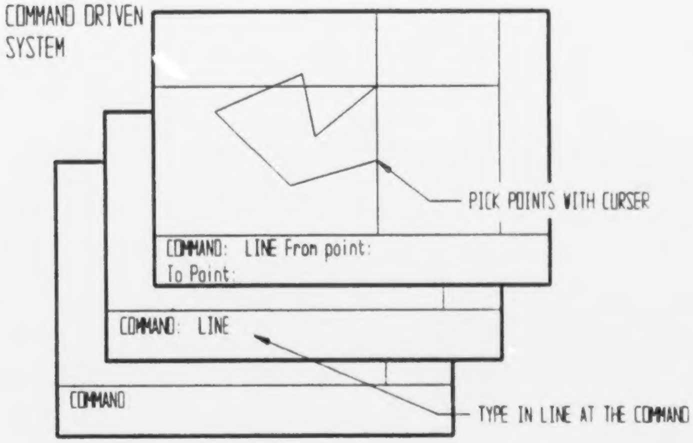
c. The electronically coded data in the form of computer programs, data, and operating systems that are loaded into computer RAM are referred to as software.

d. Software is executed or run by the computer, and types of software range from wordprocessing and data bases to games and educational programs.

8. **Types of CAD systems and their characteristics**

a. **Command-driven system** — Allows an operator to type in a command word or letter from the keyboard to make the system operate

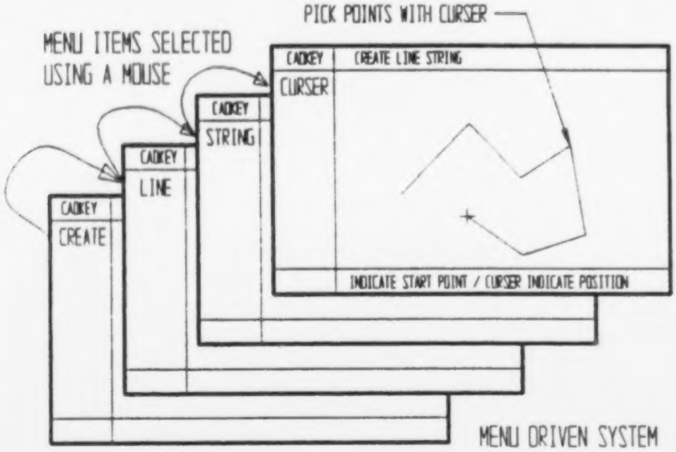
Example: To draw a line in AutoCAD, type in L or LINE at the COMMAND prompt. AutoCAD also has an available screen menu and a graphics tablet menu.


COMMAND DRIVEN SYSTEM
PICK POINTS WITH CURSER
COMMAND: LINE From point:
To Point:
COMMAND: LINE
COMMAND
TYPE IN LINE AT THE COMMAND

Information Sheet

b. **Menu-driven system** — Allows the operator to select with a mouse and curser menu items to make the CAD system operate; the operator does not type in commands, but selects commands with a mouse and curser.

Example: To draw a line in CADKEY, pick CREATE from the initial menu, then pick LINE from the next menu, and then pick STRING from the last menu.


PICK POINTS WITH CURSER
MENU ITEMS SELECTED
USING A MOUSE
CADKEY
CREATE LINE STRING
CURSER
CADKEY
STRING
CADKEY
LINE
CADKEY
CREATE
INDICATE START POINT / CURSER INDICATE POSITION
MENU DRIVEN SYSTEM

9. **DOS and its uses in a CAD system**

a. DOS is the acronym for Disk Operating System, a software program normally loaded onto a hard disk to boot up, operate, and generally manage the computer system.

b. DOS is accessed by typing commands on a computer keyboard.

c. DOS commands are easy to understand because many of them are expressed in plain language such as COPY or FORMAT.

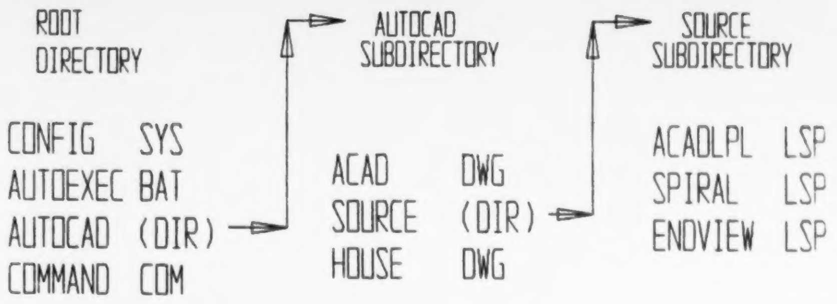
d. DOS serves significant functions in a CAD/CAM system because it manages the storage and retrieval of data that is stored in directories and files.

10. **Files and their importance in a CAD system**

a. Files contain data that has been saved for reference or operational use at a later date.

b. Files must be properly entered into a directory which keeps related data in proper order so it can be readily accessed for reference, revision, printing, or plotting.

c. Directories and subdirectories must be named so that they provide a path to the locations where individual files are stored.


ROOT DIRECTORY
CONFIG SYS
AUTOEXEC BAT
AUTOCAD (DIR)
COMMAND COM
AUTOCAD SUBDIRECTORY
ACAD DWG
SOURCE (DIR)
HOUSE DWG
SOURCE SUBDIRECTORY
ACADLPL LSP
SPIRAL LSP
ENDVIEW LSP

d. A file that contains standard information is called a "setup file" and such a file may contain such information as layer, colors, line types, grid on, snap on, limits, etc.

Example: In AutoCAD, the setup file is referred to as a prototype drawing called ACAD.DWG; other CAD systems use other names to identify setup files; some are automatically loaded and some are loaded based upon the application.

e. Since several files may be listed under one directory, an operator can access the complete directory by typing DIR, a part of DOS that manages access to directories.

11. Advantages of CAD/CAM systems

a. Generally speaking, CAD/CAM systems are faster and more accurate than drafting projects done on a board.

b. An outstanding feature of a CAD system is its capacity to store work that has taken hours, days, or weeks to create so that the work can be readily printed, plotted, or revised as needs dictate.

c. A CAD workstation cannot replace the need for an operator to have command of basic drafting knowledge such as geometric constructions, but with a command of basics, a CAD operator can produce a product with greater accuracy, and store and change the work much faster than board changes can be accomplished.

CAD Terms
Unit 1

Assignment Sheet 1—Convert CAD Terms to Acronyms

Name ______________________________ Overall Rating __________

Evaluation criterion	Rating
Number of correct conversions	______

Directions: Convert the following CAD terms to acronyms.

Term **Acronym**

1. Computer Aided Drafting __________
2. Computer Aided Design __________
3. Computer Aided Design and Drafting __________
4. Computer Aided Manufacturing __________
5. Computer Aided Drafting/Computer Aided Manufacturing __________
6. Computer Aided Engineering __________
7. Random Access Memory __________
8. Read Only Memory __________

CAD Terms
Unit 1

Assignment Sheet 2—Convert CAD Acronyms to CAD Terms

Name ________________________ Overall Rating __________

Evaluation criterion	Rating
Number of correct conversions	______

Directions: Convert the following CAD terms to acronyms.

Acronym	Term
1. CAD	(a) ________________________
	(b) ________________________
2. CADD	________________________
3. CAM	________________________
4. CAD/CAM	________________________
5. CAE	________________________
6. RAM	________________________
7. ROM	________________________

CAD Terms
Unit 1

Assignment Sheet 3—Convert Bytes, Kilobytes, and Megabytes to Selected Storage Formats

Name ______________________________ Overall Rating __________

Evaluation criterion	**Rating**
Number of K and MB conversions to bytes	______
Number of byte conversions to K and MB	______

Directions: Convert the following bytes, kilobytes, and megabytes into the formats indicated.

Example: 640K = 640 × 1000 = 640,000 bytes

Format		**Conversion Format**
1.	720 K	____________ bytes
2.	1.44 MB	____________ bytes
3.	2MB	____________ bytes
4.	360K	____________ bytes
5.	1.2MB	____________ bytes
6.	11,616 bytes	____________K
7.	3,500,000 bytes	____________MB
8.	80,000,000 bytes	____________MB
9.	29,000 bytes	____________K
10.	345,000 bytes	____________K

CAD Hardware
Unit 2

Objective Sheet

Unit Objective

After completing this unit, the student should be able to sketch CAD hardware and identify each part. The student should demonstrate these competencies by completing the assignment sheet and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to CAD hardware with their correct definitions.
2. Complete statements about the functions of input devices.
3. Complete statements about the functions of output devices.
4. Select true statements about memory devices and their uses in a computer system.
5. Complete statements about other CAD devices for CAD systems.
6. Sketch CAD hardware and identify each part. (Assignment Sheet 1)

CAD Hardware
Unit 2

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction or individual learning activities. Study the specific objectives to determine the order in which you will present the objectives.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for enrichment of exceptional students as well as accommodation of special needs students.

4. Make transparencies from transparency masters included with this unit. These appear in the teacher guide only and are designed to be used with the following objectives:

   TM 1—Input Devices (Objective 2)
   TM 2—Input Devices (Objective 2)
   TM 3—Input Devices (Objective 2)
   TM 4—Output Devices (Objective 3)
   TM 5—Memory Storage Devices (Objective 4)

5. Make copies of any handouts that you plan to distribute to students.

6. Review instructions for evaluating student performance, and make copies of Unit Evaluation Form.

Delivery and Application

7. Provide students with unit of instruction.

8. Discuss unit and specific objectives.

9. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic skills when applicable.

10. Discuss the assignment sheet. Review criteria for evaluation of these activities.

Evaluation

11. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

12. Make copies of the written test. Add or modify test items as needed.

Suggested Activities

13. Give written test.

14. Compile assignment sheet rating and written test scores on the Unit Evaluation Form. Include any additional assignments.

15. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Introduce the unit by discussing the importance of CAD terms in communicating with fellow employees. Skill areas: **Communication skills, listening**.

2. Explain the use of acronyms as short cuts in communications. Skill areas: **Communication skills, listening**.

3. Collect examples of acronyms used in the aircraft industry, automotive industry, electronics industry, and others. This may be done individually or as a group activity. Skill areas: **Group effectiveness skills, teamwork**.

4. Use Transparency 1 to discuss computer hardware. Skill areas: **Foundation skills, science**.

5. Use Transparency 2 to discuss input devices. Skill areas: **Foundation skills, science**.

6. Use Transparency 3 to discuss output devices. Skill areas: **Foundation skills, science**.

7. Use Transparency 4 to discuss memory storage devices. Skill areas: **Foundation skills, science**.

Resources Used in Developing This Unit

1. Bertoline, Gary R. *Fundamentals of CAD.* Albany, NY: Delmar Publishers Inc., 1988.

2. Giesecke, Frederick, et. al. *Technical Drawing, 9th Ed.* New York: Macmillan Pub. Co., 1991.

3. Goetsch, David L. *Microcadd Computer Aided Design and Drafting on Microcomputers.* New Jersey: Prentice Hall, 1988.

Suggested Activities

Suggested Supplemental Resources

1. Tour a computer store and identify CAD hardware.
2. Have electronics instructor take a computer apart and show the various parts.
3. Video the disassembly and assembly of a microcomputer to show in class.

CAD Hardware
Unit 2

Answers to Assignment Sheet

Assignment Sheet 1

Student performance will vary with available equipment. Use evaluation criteria in the assignment sheet, and modify as local availabilities demand.

CAD Hardware
Unit 2

Answers to Written Test

1. a. 2
   b. 1
   c. 5
   d. 4
   e. 6
   f. 7
   g. 3

2. a. Typing
   b. Mouse
   c. Tablet, tablet
   d. Scanner
   e. Cursor
   f. Monitor screen
   g. Lever
   h. Location
   i. Training
   j. Buttons

3. a. Output
   b. Raster
   c. CAM
   d. Digital
   e. Cathode Ray Tube
   f. Flat

4. a, d, e, f, g

5. a. Lightening
   b. Switch boxes

CAD Hardware
Unit 2

Written Test

Name ______________________________ Date __________________ Score ____________

1. Match the terms on the right with their correct definition.

______a. The computer brain of a CAD system that controls the retrieval, decoding, and processing of information

______b. A large central computer facility with the largest and most powerful computer

______c. A mid-sized computer of a capability and size between those of a mainframe and a microcomputer

______d. A small desktop computer referred to as a personal computer

______e. Any device used to enter data into a computer. For example: digitizer, mouse, keyboard.

______f. Any device used to produce the end product of a computer process

______g. Any device used for the depository of all information, data, and programs related to a computer system

1. Mainframe Computer
2. CPU (Central Processing Unit)
3. Storage Device
4. Microcomputer
5. Minicomputer
6. Input Device
7. Output Device

2. Complete statements about input devices and their functions. Circle the information that best completes each of the following statements.

   a. An input device where (**typing**) (**pointing**) skills are of a great help is a keyboard.

   b. An input or locator device where selection from a menu on a monitor screen is accomplished by moving a (**mouse**) (**tablet**) and picking a button.

   c. An input device consisting of an electronic (**tablet**) (**table**) on which is mounted a menu to be digitized by a puck or stylus is called a digitizing (**tablet**) (**table**).

Written Test

d. To digitize drawings or text all in one operation a (**scanner**) (**modem**) may be used.

e. When an input device uses a ball to move the (**cursor**) (**plotter**) it is called a trackball.

f. A hand held input device held against the (**graphic tablet**) (**monitor screen**) used for designating a location or selection of a menu item is called a light pen.

g. A joystick controls the movement of the cursor by moving a hand controlled (**lever**) (**mouse**) to manually enter the coordinates being digitized into the system.

h. An input device for (**digitizing**) (**location**) uses two thumbwheels to move the cursor in the x and y directions.

i. Voice input saves time and unnecessary movement of the cursor, but requires (**tutoring**) (**training**) the system with a voice recognizer.

j. A programmed function board is an input device with rows and columns of (**buttons**) (**pixels**) programmed to activate when depressed to perform a specific function.

3. Complete statements about output devices and their functions. Circle the information that best completes each of the following statements.

   a. A plotter is a peripheral (**output**) (**input**) device used to produce drawings of the images of the graphical data base created by the CAD system.

   b. A printer is a peripheral output device used to make (**raster**) (**vector**) drawings and text of the images of the graphical data base created by the CAD system or wordprocessing file.

   c. A paper tape punch is a peripheral output device used to punch a perforated paper tape with (**CAM**) (**CAD**) data used by numerical controlled machines.

   d. A device to send (**digital**) (**antilog**) signals over a telephone line, optical fiber, or microwave is called a modem

   e. A display device called a (**Cathode Ray Tube**) (**printer**) comes in the form of a raster display terminal, vector storage display terminal, and vector refresh display terminal.

   f. A display device called a (**flat**) (**round**) terminal display comes in the form of plasma display, liquid crystal display, and flat display.

Written Test

4. Select true statements about memory storage devices and their characteristics. Place an "X" beside each true statement.

   ______a. A hard disk has a magnetic coating on a rigid aluminum platter that spins in an airtight enclosure inside a computer.

   ______b. Hard disks are used for large memory storage, and their capacities range from 10MB to 30MB.

   ______c. A floppy disk is a rigid 5¼" disk used for memory storage in two capacities, a low-density 180K disk and a high-density 1.2MB disk.

   ______d. Floppy disks are utilitarian because they are transportable from one computer to another.

   ______e. A microdisk is a 3½" flexible disk in a rigid container, and used for memory storage in increasing capacities from 720K.

   ______f. Magnetic tapes have high-capacity memory storage and are used for archiving or backup of drawings and data.

   ______g. A CD ROM is a large capacity compact disk with read only memory storage; used to store very large symbol libraries.

5. Complete statements about other devices used with CAD systems. Circle the information that best completes each of the following statements.

   a. A surge protector is used to protect the computer from electrical power overloads caused by (**rain**) (**lightening**) and voltage spikes.

   b. The linking of computers to peripheral devices by (**ROM**) (**switch boxes**) allows several devices to be used by several computers.

***Permission to duplicate this test is granted.**

CAD Hardware
Unit 2

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Sketch CAD Hardware and Identify Each Part Rating _____

Comments: ____

____

Written Test Scores

Pretest _____ Posttest _____ Other _____

Other ____

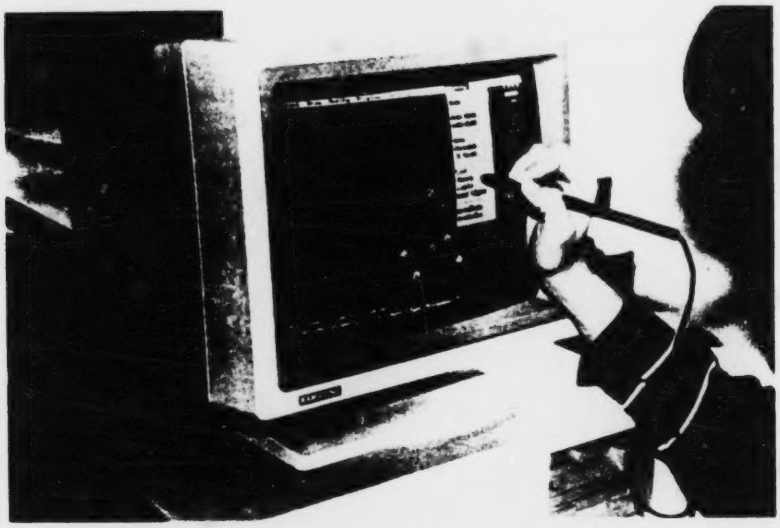
____

Teacher Signature ______________________________ Date __________

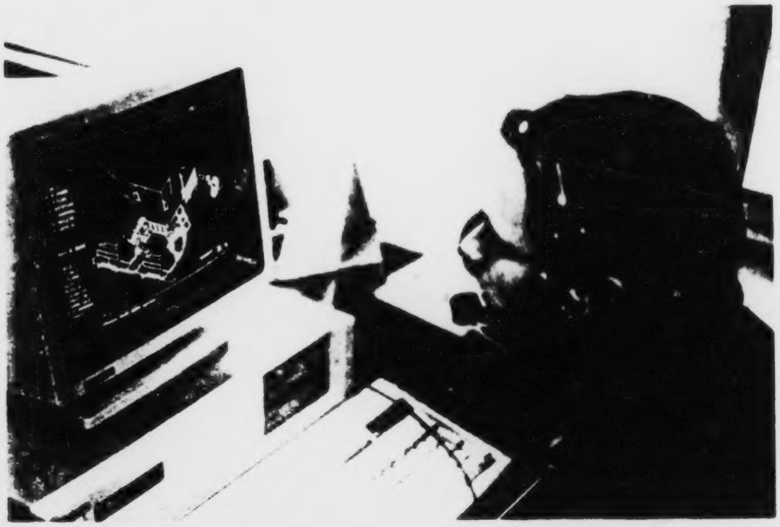
Student Signature ______________________________ Date __________

***Permission to duplicate this form is granted.**

Input Devices

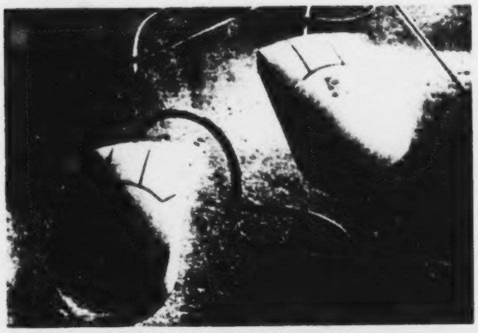


Inputting with a light pen



Inputting with voice commands

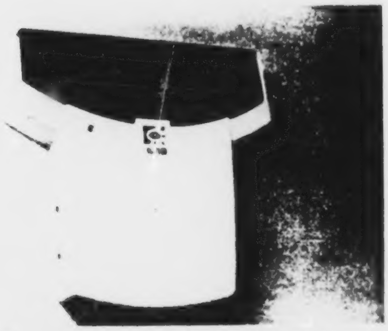
Input Devices
(Continued)



3-button Mouse Logitech "Mouseman"

Trackball Mouse Logitech "Trackman"

3-D Mouse Logitech "3D Mouse"

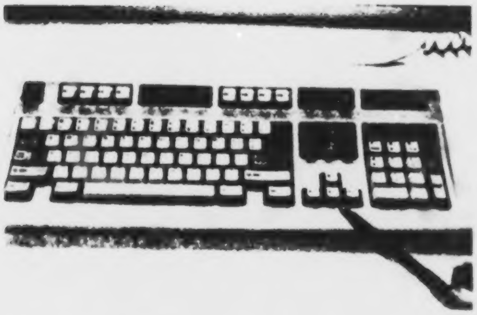


Hand Scanner Logitech "Scanman"

Photos Courtesy of Logitech, Inc.

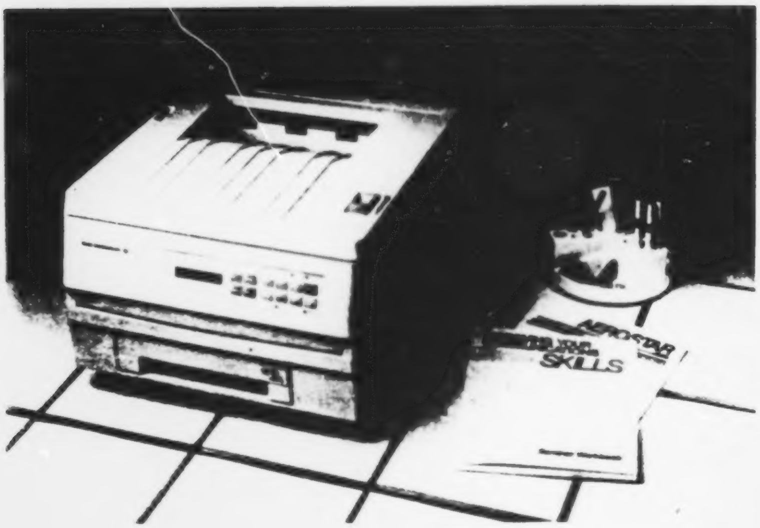
Input Devices
(Continued)

IS/ONE graphics tablet courtesy KURTA®


101 Keyboard
(Notice separate arrow keys)

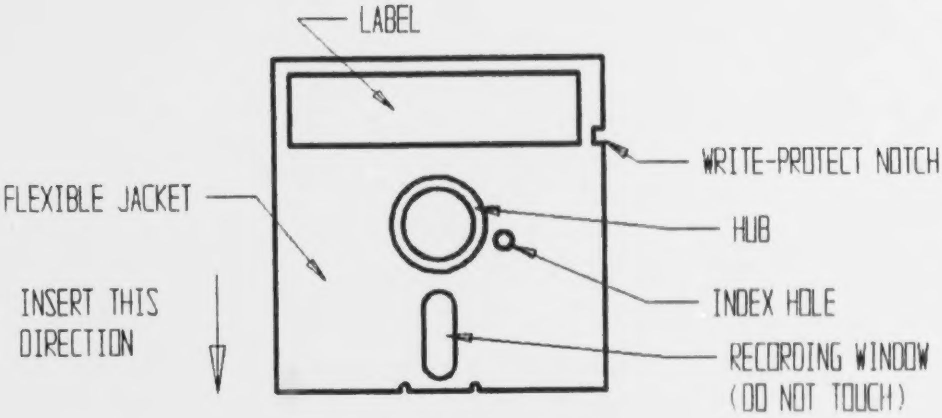
SummaSketch® graphics tablet with stylus Compliments of SUMMAGRAPHICS CORPORATION

Output Devices

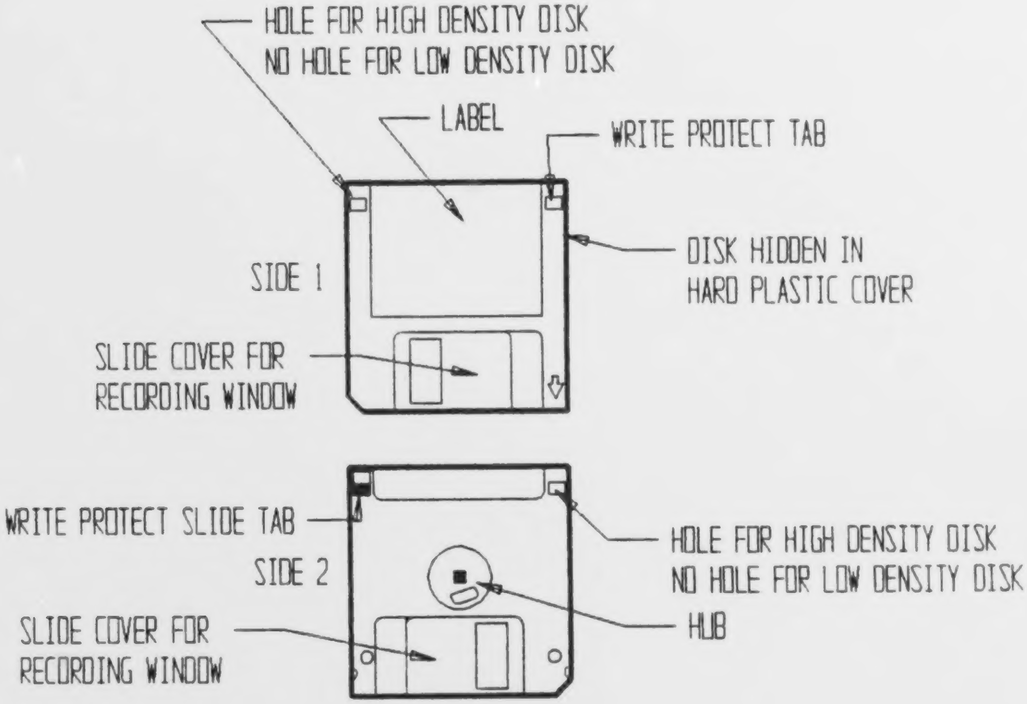

Laser Printer
MicroLaser XL courtesy Texas Instruments Incorporated

Plotter
HP 7475 Plotter for A & B size paper

Memory Storage Devices


LABEL
WRITE-PROTECT NOTCH
FLEXIBLE JACKET
HUB
INDEX HOLE
INSERT THIS DIRECTION
RECORDING WINDOW (DO NOT TOUCH)

5 1/4" FLOPPY DISK


HOLE FOR HIGH DENSITY DISK
NO HOLE FOR LOW DENSITY DISK
LABEL
WRITE PROTECT TAB
DISK HIDDEN IN HARD PLASTIC COVER
SIDE 1
SLIDE COVER FOR RECORDING WINDOW
WRITE PROTECT SLIDE TAB
SIDE 2
HOLE FOR HIGH DENSITY DISK
NO HOLE FOR LOW DENSITY DISK
HUB
SLIDE COVER FOR RECORDING WINDOW

3 1/2" MICRO FLOPPY DISK

CAD Hardware
Unit 2

Information Sheet

1. **Terms and definitions**

    a. **Central Processing Unit (CPU)** — The computer brain of a CAD system that controls the retrieval, decoding, and processing of information, including arithmetic and logic functions

    b. **Mainframe Computer** — A large central computer facility with the largest and most powerful computer

    c. **Minicomputer** — A mid-sized computer of a capability and size between those of a mainframe and a microcomputer

    d. **Microcomputer** — A small desktop computer referred to as a personal computer

    e. **Input Device** — Any device used to enter data into a computer

    Example: Mouse, graphics tablet, keyboard

    f. **Output Device** — Any device used to produce the end product of a computer process

    Example: Printer, plotter

    g. **Storage Device** — Any device used for the depository of all information, data, and programs related to a computer system

    Example: Hard (fixed) disk, floppy disk

2. **Input devices and their functions**

    a. The keyboard is and input device where data is typed into a system.

    b. A mouse is an input device used to select from a menu on a monitor screen by picking a button on the mouse.

    Example: Mice may have 2, 3, or more buttons which can be assigned to perform other commands

    c. A graphics tablet is an electronic board with a mounted menu from which an item is selected by moving a puck or stylus over an item then pressing a button.

    Example: Graphic tablets come in several sizes to allow for more functions.

Information Sheet

d. A scanner is used to digitize drawings or text in one operation into a computer system.

e. An input device called a trackball has a ball on top that is moved and in turn moves a cursor on a screen.

f. A hand held light pen placed against the monitor screen is used to select from a menu or to digitize a location.

g. A joystick controls the movement of the cursor by moving a hand controlled lever to manually move the cursor location into the system.

h. An input device made up of two thumbwheels is designed to locate the cursor in the x and y directions.

i. Voice input saves time and unnecessary movement of the cursor, but requires training the system with a voice recognizer.

j. A programmed function board is an input device with rows and columns of buttons programmed to activate when depressed to perform a specific function.

3. **Output devices and their functions**

a. A plotter is a peripheral output device used to produce drawings of the images of the graphical data base created by the CAD system.

b. A printer is a peripheral output device used to make raster drawings and text of the images of the graphical data base created by the CAD system or wordprocessor.

c. A paper tape punch is a peripheral output device used to punch a perforated paper tape with CAM data used by numerical controlled machines.

d. A device called a Modem is used to send digital signals over a telephone line, optical fiber, or microwave.

e. A display device called a Cathode Ray Tube comes in the form of a raster display terminal, vector storage display terminal, and vector refresh display terminal.

f. A display device called a flat terminal display comes in the form of plasma display, liquid crystal display, and flat display.

Information Sheet

4. **Memory storage devices and their characteristics**

   a. A hard disk has a magnetic coating on a rigid aluminum platter that spins in an airtight enclosure inside a computer.

   b. Hard disks are used for large memory storage, and their capacities range from 10MB to well over 200 MB.

   c. A floppy disk is a nonrigid 5¼″ disk used for memory storage in two capacities, a low-density 360K disk and a high-density 1.2MB disk.

   d. Floppy disks are utilitarian because they are transportable from one computer to another.

   e. A microdisk is a 3½″ flexible disk in a rigid container, and used for memory storage in increasing capacities from 720K.

      Note: A microdisk is usually called a floppy disk even though it is in a rigid container.

   f. Magnetic tapes have high-capacity memory storage and are used for archiving or backup of drawings and data.

      Note: Magnetic tapes use sequential access which makes both process and access time slower.

   g. A CD ROM is a large capacity compact disk with read only memory storage; used to store very large symbol libraries.

5. **Other devices used with CAD systems**

   a. A surge protector is used to protect the computer from electrical power overloads caused by lightening and voltage spikes.

   b. Switch boxes are used to link computers to peripheral devices so that several different devices can be used by several different computers.

CAD Hardware
Unit 2

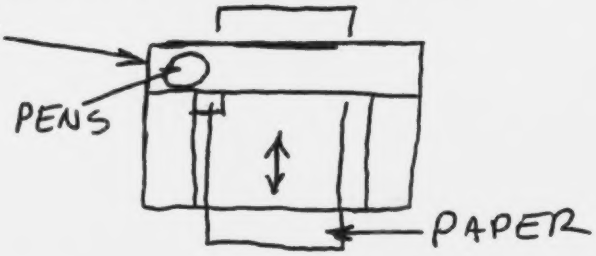
Assignment Sheet 1—Sketch CAD Hardware and Identify Each Part

Name ______________________________ Overall Rating ________

Evaluation criteria	**Rating**
Sketched hardware item in a neat manner	______
Identified each part by name and manufacturer	______

Directions: Visit a CAD workstation at school or in an industry. Sketch and identify the parts of the system. Sketch the computer, the monitor, the keyboard, the printer, plotter, and input devices such as mouse, scanner, or graphics tablet. Make your sketches in the six spaces provided and be sure to identify each item by its common name, manufacturer's name, and model number. The following sketch should provide a guideline for your work.

For example: Plotter, H.P. 7475



1. Computer

Assignment Sheet 1

2. Monitor

3. Keyboard

4. Printer

Assignment Sheet 1

5. Plotter

6. Input devices

Parts of a CAD System
Unit 3

Objective Sheet

Unit Objective

After completing this unit, the student should be able to identify external parts of a CAD system and internal parts of a microcomputer. The student should also be able to identify types, sizes, and capacities of selected disks. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to parts of a CAD system with their correct definitions.
2. Identify components of a CAD system.
3. Select true statement about CAD system printers and their characteristics.
4. Complete statements about CAD plotters and their characteristics.
5. Complete statements about basic elements of a microcomputer motherboard.
6. Select true statements about types of computer ports and power connections.
7. Match graphic display cards with their characteristics.
8. Complete statements about floppy drives and disks and their characteristics.
9. Select true statements about hard drives and their characteristics.
10. Select true statements about disk controller cards and their characteristics.
11. Select true statements about network cards and their characteristics.
12. Complete statements about power supplies and their characteristics.
13. Identify external parts of a CAD system. (Assignment Sheet 1)
14. Sketch and identify internal parts of a microcomputer. (Assignment Sheet 2)
15. Identify type, size, and capacity of selected disks. (Assignment Sheet 3)

Parts of a CAD System
Unit 3

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction or individual learning activities. Study the specific objectives to determine the order in which you will present the objectives.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan for enrichment of exceptional students as well as accommodation of special needs students.

4. Make transparencies from transparency masters included with this unit. These appear in the teacher guide only and are designed to be used with the following objectives:

   TM 1—Horizontal and Vertical Microcomputers (Objective 2)
   TM 2—Printers and Plotters (Objectives 3 and 4)
   TM 3—Printers and Plotters (Objective 4)
   TM 4—Graphics Display Resolution (Objective 7)

5. Make copies of any handouts that you plan to distribute to students.

6. Review instructions for evaluating student performance, and make copies of Unit Evaluation Form.

Delivery and Application

7. Provide students with unit of instruction.

8. Discuss unit and specific objectives.

9. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic skills when applicable.

10. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Evaluation

11. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

12. Make copies of the written test. Add or modify test items as needed.

Suggested Activities

13. Give written test.

14. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments.

15. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Introduce the unit by discussing the importance of parts of a CAD system in communicating with fellow employees. Skill areas: **Communications skills, listening**.

2. Explain when purchasing a CAD system the importance of knowing the different parts of a computer in order to purchase the best quality at the lowest cost. Skill areas: **Personal skills management, personal and career development**.

3. Find an old computer system the students can take apart and reassemble. The students will have a better appreciation of computers and lose their fear of computers by getting their hands on the hardware and connectors. Skill areas: **Foundation skills, science**.

4. Use Transparency 1 to discuss horizontal and vertical microcomputers. Skill areas: **Communication skills, listening**.

5. Use Transparency 2 to discuss printers and plotters. Skill areas: **Communication skills, listening**.

6. Use Transparency 3 to discuss graphic display resolution. Skill areas: **Communication skills, listening**.

Resources Used in Developing This Unit

1. Bertoline, Gary R. *Fundamentals of CAD*, 2nd Edition. Albany, NY: Delmar Publishing Inc., 1988.

2. Goetsch, David L. *Microcadd Computer-Aided Design and Drafting on Microcomputers*. New Jersey: Prentice Hall, 1988.

3. Giesecke, Frederick E. *Technical Drawing*, 9th edition. New York: Macmillan Publishing Company, 1991.

Parts of a CAD System
Unit 3

Answers to Assignment Sheets

Assignment Sheet 1

1. Evaluate sketching and lettering ability.
2. Parts of a computer: computer, on/off switch, turbo switch, disk drives, etc.
3. Ports on the back of the computer: serial, parallel, keyboard, game, mouse, graphics tablet, etc.
4. Peripheral devices: printer, plotter, keyboard, graphics tablet, mouse, joystick, etc.

Assignment Sheet 2 — Evaluate student according to evaluation criteria. Extra points may be added for additional items sketched and identified and for neatness.

Assignment Sheet 3

1. High density, 3½", 1.44MB
2. High density, 5¼", 1.2KB

Parts of a CAD System
Unit 3

Answers to Written Test

1. a. 6
   b. 5
   c. 9
   d. 1
   e. 8
   f. 4
   g. 7
   h. 2
   i. 3

2. a. 3
   b. 10
   c. 9
   d. 1
   e. 4
   f. 8
   g. 6
   h. 5
   i. 11
   j. 7
   k. 2

3. b, c, d, f, g, h

4. a. Film
   b. Running out of ink
   c. Many tiny dots
   d. More
   e. Good
   f. Printed circuit industry
   g. Multicolors
   h. Multicolored

5. a. Memory
   b. CPU
   c. Slots
   d. Performance

6. a, b, d

7. a. 3
   b. 2
   c. 4
   d. 1
   e. 5

8. a. 360KB
   b. Cannot
   c. 1.2MB
   d. Can
   e. 720KB
   f. 1.44MB
   g. Ejection

Answers to Written Test

9. b, c, d, e

10. a

11. b, c

12. a. Internal
    b. Memory

Parts of a CAD System
Unit 3

Written Test

Name ______________________________ Date _________________ Score ____________

1. Match the terms on the right with their correct definitions.

______a. A plug-in "D" shaped connector with 9 or 25 pins used to connect the computer to an input or output device

______b. A plug-in "D" shaped connector with 25 pins used to connect the computer to an input or output device

______c. A printed circuit card that plugs into a slot on the motherboard to control the resolution or number of picture elements (pixels) on the monitor

______d. A printed circuit card that plugs into the motherboard to allow connection to other computers by way of a network

______e. A device in the computer that converts 100 volts house current to 130 or 200 Watts of power to drive the computer system

______f. The main or largest printed circuit board on which are mounted integrated circuits, several expansion slots for other PC boards, memory, CPU, and other components

______g. A serial port with nine pins used for a joystick or mouse

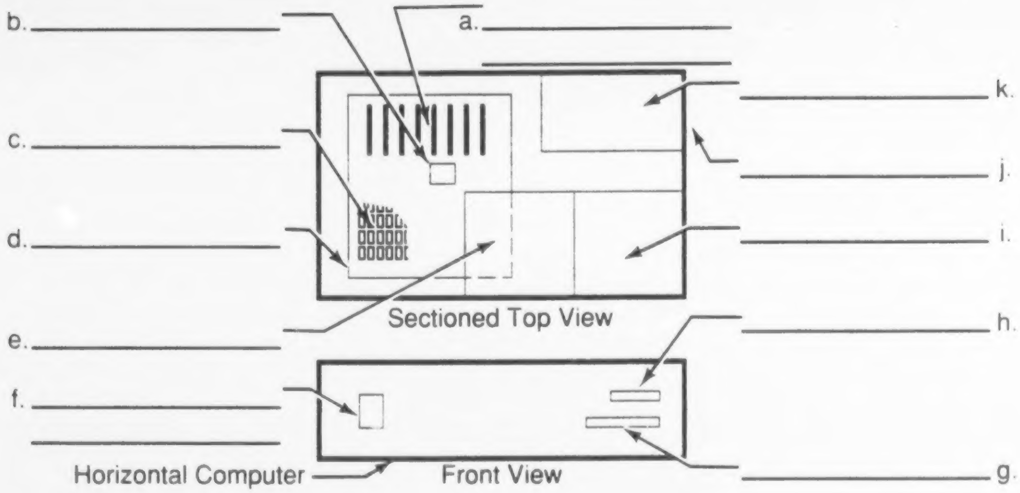
______h. An IC chip inserted or integrated on the motherboard that increases the speed of the arithmetic operations and speeds up the CAD system

______i. A printed circuit board card that plugs into a slot on the motherboard to control the hard disk and floppy disk drives

1. Network card
2. Math co-processor
3. Controller card
4. Motherboard
5. Parallel port
6. Serial port
7. Game port
8. Power supply
9. Graphics card

Written Test

2. Identify the following components of a CAD system. Place the number of the component in the appropriate blank on the illustration.


b.
a.
k.
c.
j.
d.
i.
Sectioned Top View
e.
h.
f.
Horizontal Computer
Front View
g.

1. Motherboard
2. Power supply
3. Slots for PC input/output cards
4. Hard disk
5. Slot of 3½″ minidisk
6. Slot for 5 ¼″ floppy disk
7. On/Off switch
8. Lights/key lock
9. Memory chips
10. CPU
11. Floppy drives

Written Test

3. Select true statements about CAD system printers and their characteristics. Place an "X" beside each true statement.

_______a. Basically, a printer gives a CAD operator the ability to print only text.

_______b. Printers accept a variety of paper feeds: form feed, single sheet manual feed, or single sheet automatic feed.

_______c. Printers can print in mono or color.

_______d. Printers can access different font styles and point sizes.

_______e. Printer output is a standard 8½ × 11 sheet size.

_______f. Dot-matrix printers can print in 9-pin draft quality resolution or 24-pin near-letter quality resolution.

_______g. Laser printers print in a resolution measured in d.p.i. (dots per square inch); laser printers are high resolution printers.

_______h. Printer types include the dot-matrix or impact printers, laser printers, inkjet printers, and thermal printers.

4. Complete statements about types of CAD plotters and their characteristics. Circle the material that best completes each of the following statements.

   a. Electromechanical pen plotters include drum type and flatbed plotters which use an ink pen, ball point, lead pen, knife, or light to produce an image on vellum, Mylar®, or (**film**) (**aluminum plates**).

   b. Electromechanical pen plotters have a high degree of accuracy and repeatability, but they are slow and have a problem with (**running out of ink**) (**low resolution**).

   c. Electrostatic plotters produce fast, high quality prints, by using (**image areas**) (**many tiny dots**) that overlap.

   d. Electrostatic plotters are usually (**less**) (**more**) expensive than electromechanical pen plotters.

   e. Laser plotters produce (**low**) (**good**) resolution and high quality prints using laser light to produce an image.

   f. Photo plotters are used by the (**automotive industry**) (**printed circuit industry**); these plotters use a photographic process.

g. Ink jet plotters use jets of ink to produce good solid modeling where (**multicolors**) (**low resolutions**) are needed.

h. Ink jet plotters have slow plotting speeds, but the result is good quality (**low resolution**) (**multicolored**) plotting.

5. Complete statements about basic elements of microcomputer motherboard. Circle the material that best completes each of the following statements.

a. The motherboard is the most basic part of a microcomputer because it contains the (**memory**) (**floppy disk**) that controls both the size of operations it can perform as well as performance speed.

b. The motherboard also contains the (**serial parts**) (**CPU**) and may also have a math co-processor or a slot where a math co-processor can be added.

c. The motherboard also contains other (**slots**) (**connections**) for the installation of PC input/output cards that include graphic displays cards, disk controller cards, and network cards.

d. In general, the motherboard is the matrix on which a computer system is built, and memory size and the number of available slots either confine or expand the (**performance**) (**speed**) characteristics of the system.

6. Select true statements about types of computer ports and power connections. Place an "X" beside each true statement.

______a. The power connection on a computer is for 110 volts.

______b. Both male and female serial ports on a computer are "D" shaped and are either 9-pin serial or 25-pin serial.

______c. Both male and female parallel ports on a computer are "D" shaped with 9 pins.

______d. Mouse ports on a computer may be a 9-pin "D" connector for a serial mouse, or a 9-pin round connector for a bus mouse.

______e. Game ports are always parallel.

Written Test

7. Match graphics display cards with their characteristics. Place the number of the card type in the blank beside the proper characteristics.

______a. Black or amber or green and white with 720 × 348 pixels

______b. 640 × 200 pixels resolution with 4 colors

______c. 640 × 350 pixels resolution with 16 colors

______d. 640 × 480 pixels resolution with up to 256 colors

______e. 1024 × 768 pixels resolution with up to 256 colors

1. VGA
2. CGA
3. Monochrome
4. EGA
5. PGA

8. Complete statements about floppy drives and disks and their characteristics. Circle the material that best completes each of the following statements.

a. Low-density drives read and write to a double-sided floppy disk 5¼ inches in diameter with a capacity of (**360KB**) (**1.2MB**).

b. A low-density drive (**cannot**) (**can**) read, write, or format a high-density floppy disk.

c. High-density drives read and write to a double-sided floppy disk 5½ inches in diameter with a capacity of (**1.2MB**) (**360KB**).

d. A high-density drive (**can**) (**cannot**) read, write, and format a low-density disk at 360KB.

e. Low-density microdisk drives are low-capacity drives that read, write, and format a 3½ inch double-sided microdisk with a capacity of (**720KB**) (**1.2MB**).

f. High-density microdisk drives are high-capacity drives that read, write, and format a 3½ inch double-side microdisk with a capacity of (**1.44MB**) (**720KB**).

g. Other elements of floppy drives are the "disk drive in use light" which comes on when the drive is reading data from or writing data to a diskette, and the disk drive (**ejection**) (**stop**) button which releases a diskette from a drive.

Written Test

9. Select true statements about hard drives and their characteristics. Place an "X" beside each true statement.

______a. A hard drive is permanently fixed in the microcomputer, but is easy to remove without opening the computer.

______b. A hard drive contains one or more hard metal circular plates coated with an oxide material that allows data to be stored magnetically on the surface.

______c. A hard drive has a greater storage capacity than floppy diskettes or microdisks; hard drive capacity ranges from 20MB to 1.6 GB.

______d. The speed of a disk drive is very important in a CAD system because some of the graphics data generated is greater that the capacity of the RAM memory, so the data must be stored on a hard disk.

______e. A "hard disk in use light" comes on when the drive is reading data from or writing data to the hard drive.

10. Select true statements about disk controller cards and their characteristics. Place an "X" beside each true statement.

______a. A disk controller card is a printed circuit board that fits into one of the slots on the motherboard.

______b. A disk controller card controls only the hard disk.

11. Select true statements about network cards and their characteristics. Place an "X" beside each true statement.

______a. A network card is a printed circuit board that plugs into a parallel connection.

______b. A network card allows exchange of information and also permits a system to be connected to other computers, printers, plotters, and other peripheral devices.

______c. A network card can be connected with a telephone cable, a fiber-optic cable, or by other means.

12. Complete statements about power supplies and their characteristics. Circle the material that best completes each of the following statements.

a. A power supply is an (**internal**) (**external**) device that converts normal house current, 110 volts, into the various power demands required by a microcomputer.

b. The size of the power supply required depends on the demand of the motherboard and (**software**) (**memory**), plus the cumulative demand of all add-on boards.

***Permission to duplicate this test is granted.**

Parts of a CAD System
Unit 3

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Identify External Parts of a CAD System Rating ______

Comments: ____

____

Assignment Sheet 2—Sketch and identify Internal Parts of a Microcomputer Rating ______

Comments: ____

____

Assignment Sheet 3—Identify Type, Size, and Capacity of Selected Drives Rating ______

Comments: ____

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ____

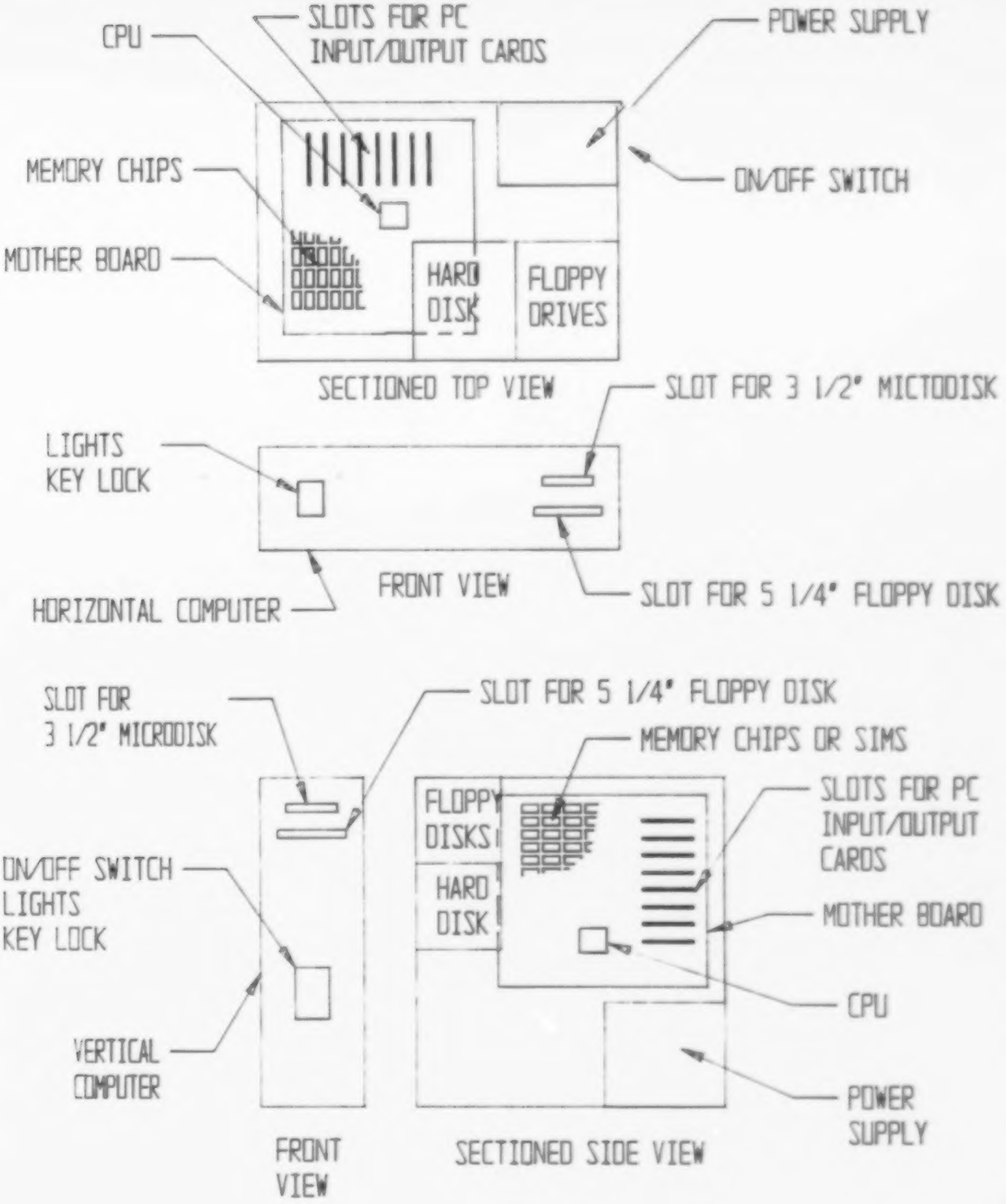
____

Teacher Signature ______________________________ Date __________

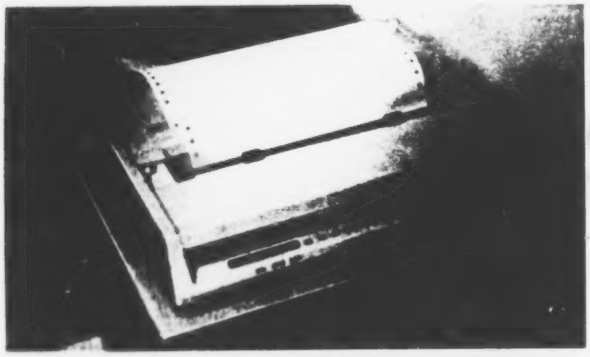
Student Signature ______________________________ Date __________

*Permission to duplicate this form is granted.

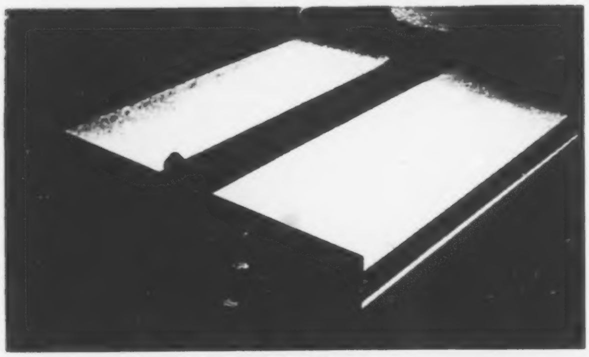
Horizontal and Vertical Microcomputers


CPU
SLOTS FOR PC INPUT/OUTPUT CARDS
POWER SUPPLY
MEMORY CHIPS
ON/OFF SWITCH
MOTHER BOARD
HARD DISK
FLOPPY DRIVES
SECTIONED TOP VIEW
SLOT FOR 3 1/2" MICTODISK
LIGHTS
KEY LOCK
FRONT VIEW
HORIZONTAL COMPUTER
SLOT FOR 5 1/4" FLOPPY DISK
SLOT FOR 3 1/2" MICRODISK
SLOT FOR 5 1/4" FLOPPY DISK
MEMORY CHIPS OR SIMS
FLOPPY DISKS
SLOTS FOR PC INPUT/OUTPUT CARDS
ON/OFF SWITCH
LIGHTS
KEY LOCK
HARD DISK
MOTHER BOARD
CPU
VERTICAL COMPUTER
POWER SUPPLY
FRONT VIEW
SECTIONED SIDE VIEW

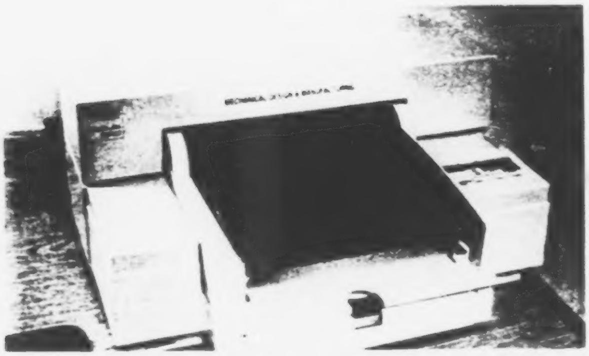
Printers and Plotters



Dot Matrix Printer

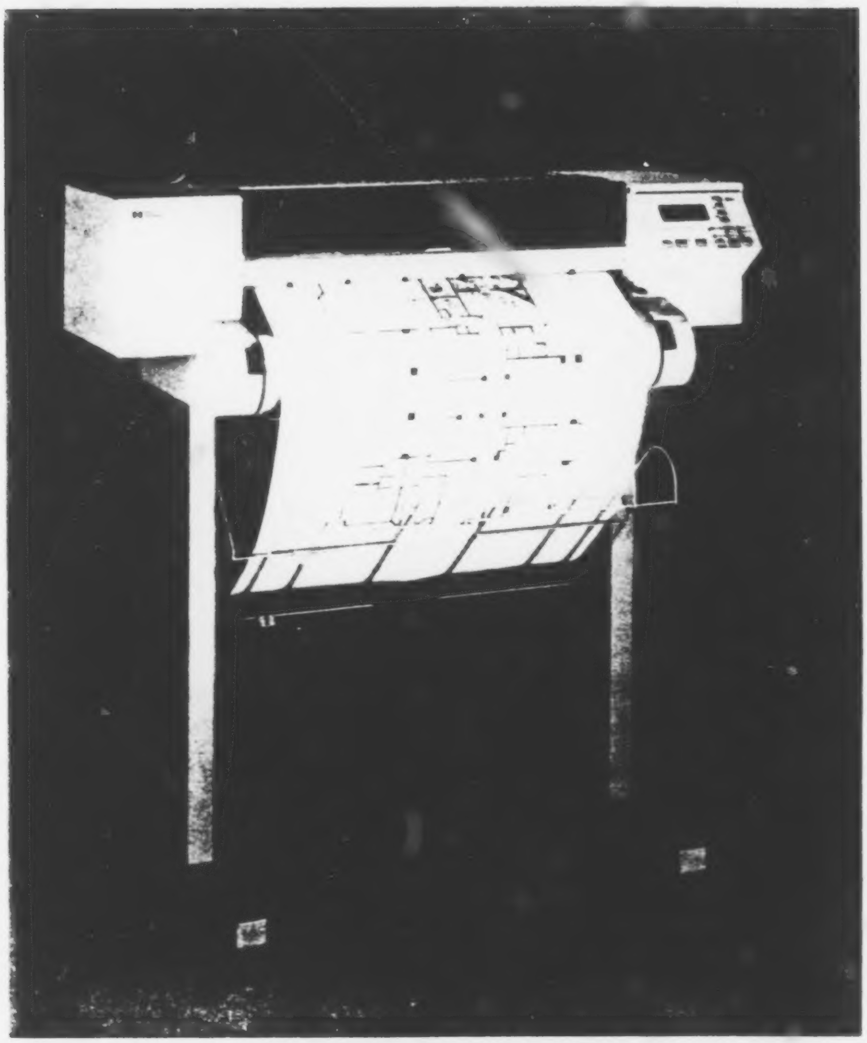


Flat Bed Plotter



Hewlett Packard "Desk Jet" Ink Jet Printer

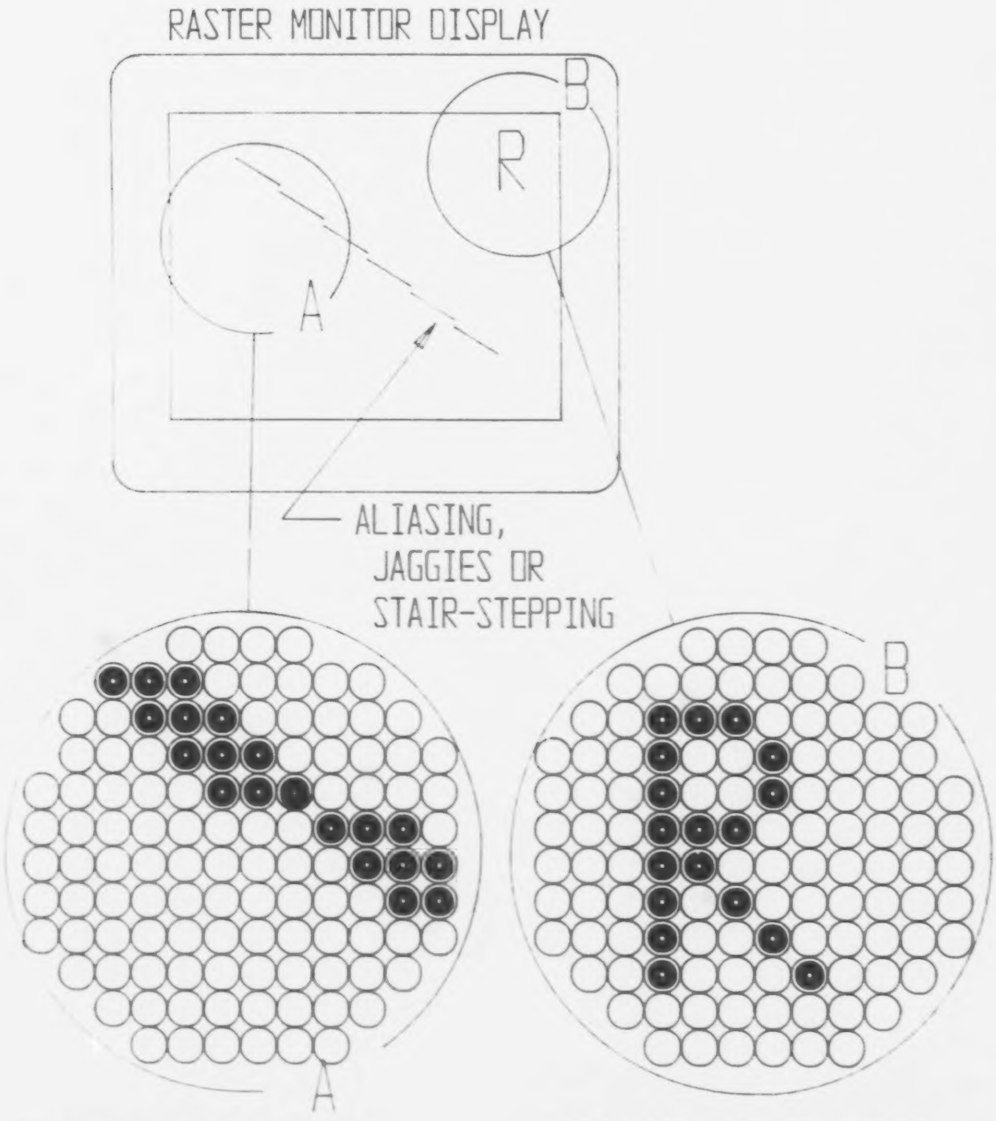
Printers and Plotters



D-size HP DesignJet 600 Plotter

Photo courtesy of Hewlett-Packard Company

Graphics Display Resolution


RASTER MONITOR DISPLAY
B
R
A
ALIASING,
JAGGIES OR
STAIR-STEPPING
B
A

ENLARGEMENT OF PIXELS SHOWING ALIASING, JAGGIES OR STAIR-STEPPING.

ENLARGEMENT OF PIXELS SHOWING HOW LETTERS AND NUMBERS ARE FORMED

Parts of a CAD System
Unit 3

Information Sheet

1. **Terms and definitions**

   a. **Controller card** — A printed circuit board card that plugs into a slot on the motherboard to control the hard disk and floppy disk drives

   b. **Game port** — A serial port with nine pins used for a joystick or mouse

   c. **Graphics card** — A printed circuit card that plugs into a slot on the motherboard to control the resolution or number of picture elements (pixels) on the monitor

   Example: Monochrome, CGA, EGA, VGA, and PGA

   d. **Math co-processor** — An IC chip inserted or integrated on the motherboard that increases the speed of the arithmetic operations and speeds up the CAD system

   Example: On 486 computers, the math co-processor is integrated with the processor on certain models.

   e. **Motherboard** — The main or largest printed circuit board on which are mounted integrated circuits, several expansion slots for other PC boards, memory, CPU, and other components

   f. **Network card** — A printed circuit card that plugs into the motherboard to allow connection to other computers by way of a network

   g. **Parallel port** — A plug-in "D" shaped connector with 25 pins used to connect the computer to an input or output device

   Example: Printer

   h. **Power supply** — A device in the computer that converts 110 volts house current to 130 or 200 watts of power to drive the computer system

   Example: The larger the computer, the greater the need for more watts of power. An XT system uses 130 watts of power and an AT system uses 200 watts of power. If the motherboard and other devices are reduced in size the amount of watts of power needed may also be reduced. A portable AT computer may need only 60 watts of power.

   Note: XT and AT are registered trademarks of the International Business Machines Corporation.

Information Sheet

i. **Serial port** — A plug-in "D" shaped connector with 9 or 25 pins used to connect the computer to an input or output device

Example: A plotter plugs into a 24-pin port and a serial mouse plugs into a 9-pin port.

2. Components of a CAD system

a. Motherboard

Example: Motherboards are rapidly changing in size and contents. As IC chips contain larger number of components and circuits, the smaller the motherboard grows. As the motherboard grows smaller, it costs less and is higher in reliability and power.

b. Power supply

Example: 200 watt power supply

c. Input PC cards

Example: Bus mouse card

d. Output PC cards

Example: Parallel card LPTI

e. Hard disk

Example: 86MB hard disk

f. Floppy and microdisk drives

Example: 1.44MB floppy microdisk

g. Power switch

Example: Found on the right of a horizontal computer and on the front of a vertical computer

h. Power light

Example: Found on the front of a computer

i. Turbo switch/light

Example: Found on the front of a computer

Information Sheet

j. Keyboard port

Example: Found on the back of a computer

k. Keyboard

Example: A 101 keyboard has 101 keys.

3. **CAD system printers and their characteristics**

a. Basically, a printer gives a CAD operator the ability to print text and/or graphics (drawings).

b. Printers accept a variety of paper feeds: form feed, single sheet manual feed, or single sheet automatic feed.

c. Printers can print in mono or color.

d. Printers can access different font styles and point sizes.

Example: Helvetica 12 pt, Times Roman 10 pt.

e. Printer output can be on different sheet sizes.

Example: 8½ × 11, 8½ × 14

f. Dot-matrix printers can print in 9-pin draft quality resolution or 24-pin near-letter-quality resolution.

g. Laser printers print in a resolution measured in d.p.i. (dots per square inch); laser printers are high resolution printers.

Note: When print quality is high enough, plotted drawings may not be needed.

h. Printer types include the dot-matrix or impact printers, laser printers, inkjet printers, and thermal printers.

4. **Types of CAD plotters and their characteristics**

a. Electromechanical pen plotters include drum type and flatbed plotters which use an ink pen, ball point, lead pen, knife, or light to produce an image on vellum, Mylar®, or film.

b. Electromechanical pen plotters have a high degree of accuracy and repeatability, but they are slow and have a problem with running out of ink.

Information Sheet

c. Electrostatic plotters produce fast, high quality prints, by using many tiny dots that overlap.

d. Electrostatic plotters are usually more expensive than electromechanical pen plotters.

e. Laser plotters produce good resolution and high quality prints using laser light to produce an image.

f. Photo plotters are used by the printed circuit industry; these plotters use a photographic process.

g. Ink jet plotters use jets of ink to produce sharp lines or solid colors.

h. Ink jet plotters have slow plotting speeds, but the result is good quality multicolored plotting.

5. Basic elements of a microcomputer motherboard

a. The motherboard is the most basic part of a microcomputer because it contains the memory that controls both the size of operations it can perform as well as performance speed.

b. The motherboard also contains the CPU (central processing unit) and may also have a math co-processor or a slot where a math co-processor can be added.

c. The motherboard also contains other slots for the installation of PC input/output cards that include graphic display cards, disk controller cards, and network cards.

d. In general, the motherboard is the matrix on which a computer system is built, and memory size and the number of available slots either confine or expand the performance characteristics of the system.

6. Types of computer ports and power connections

a. The power connection on a computer is for 110 volts.

Note: Areas where only 220 volt power is available regulate the voltage to 110 with an added converter, and some systems have a switch for 110 or 220 volts.

b. Both male and female serial ports on a computer are "D" shaped and are either 9-pin serial or 25-pin serial.

c. Both male and female parallel ports on a computer are "D" shaped with 25 pins.

Information Sheet

d. Mouse ports on a computer may be a 9-pin "D" connector for a serial mouse, or a 9-pin round connector for a bus mouse.

Note: An adapter can be used to convert a 9-pin connector to a 25-pin connector or vice-versa.

e. Game ports vary with the application.

7. Graphics display cards and their characteristics

a. Monochrome — Black or amber or green and white with 720 × 348 pixels resolution

b. CGA (Color Graphic Adapter) — 640 × 200 pixels resolution with 4 colors

c. EGA (Enhanced Graphics Adapter) — 640 × 350 pixels resolution with 16 colors

d. VGA (Video Graphics Adapter) — 640 × 480 pixels resolution with up to 256 colors

e. PGA (Professional Graphics Adapter) — 1024 × 768 pixels resolution with up to 256 colors

8. Floppy drives and disks and their characteristics

Note: The following applies to IBM and compatible microcomputer systems.

a. Low-density (capacity) drives read and write to a double-sided floppy disk 5¼ inches in diameter with a capacity of 360KB.

b. A low-density drive cannot read, write, or format a high-density floppy disk.

c. High-density (capacity) drives read and write to a double-sided floppy disk 5½ inches in diameter with a capacity of 1.2MB.

d. A high-density drive can read, write, and format a low-density disk at 360KB.

Example: To format a high-density, double-sided floppy 5¼ inch disk on a high-density disk drive, type C:\FORMAT A:/4 and press ENTER.

Information Sheet

To format a low-density, double-sided floppy 5¼ inch disk on a high-density disk drive, type C:\FORMAT A:/4 and press ENTER.

Caution: If you write on a 360KB disk using a 1.2MB drive, you may not be able to read the disk in a 360KB drive.

e. Low-density microdisk drives are low-capacity drives that read, write, and format a 3½ inch double-sided microdisk with a capacity of 720KB.

Example: Diskettes are usually labeled 1MB even though they contain only 720KB of memory. To format a low-density diskette in a 720KB microdisk drive, type C:\FORMAT A: and press ENTER.

Note: Microdisks are usually called floppy disks.

f. High-density microdisk drives are high-capacity drives that read, write, and format a 3½ inch double-side microdisk with a capacity of 1.44MB or greater.

Example: Diskettes are usually labeled HD or 2MB even though they contain only 1.44MB of memory. To format a high-density diskette in a microdisk drive type C:\FORMAT A: and press ENTER. To format a low-density 3½ inch microdiskette in a high-density disk drive, type C:\FORMAT A:/F:144OKB.

g. Other elements of floppy drives are the "disk drive in use light" which comes on when the drive is reading data from or writing data to a diskette, and the disk drive ejection button which releases a diskette from a drive.

Caution: Do not push the ejection button while the "disk drive in use light" is on.

9. Hard drives and their characteristics

a. A hard drive is permanently fixed in the microcomputer, and is not easy to remove.

Note: Hard drives are also called fixed drives.

b. A hard drive contains one or more hard metal circular plates coated with an oxide material that allows data to be stored magnetically on the surface.

Information Sheet

c. A hard drive has a greater storage capacity than floppy diskettes or microdisks; hard drive capacity ranges from 20MB to 1.6 GB (Gigabites)

Note: Storage capacity for a CAD system can be increased by adding one or more additional hard drives. One Gigabite equals 1,073,741,824 KB (1,024 × 1,024 × 1,024). Most PCs use 40, 80, or 120 MB hard disk.

d. The speed of a disk drive is very important in a CAD system because some of the graphics data generated is greater that the capacity of the RAM memory, so the data must be stored on a hard disk.

Example: The speed of a hard disk is expressed in milliseconds, M.S. For instance, a 20MB hard disk may have a speed of 45 M.S., and a 120MB hard disk may have a speed of 16 M.S. The M.S. rating is the time it takes for data to reach the hard disk from the CPU, or how fast the data can be accessed from the hard disk. This means that the 16 M.S. hard disk would move data more than twice as fast as the 45 M.S. hard disk.

e. A "hard disk in use light" comes on when the drive is reading data from or writing data to the hard drive.

10. Disk controller cards and their characteristics

a. A disk controller card is a printed circuit board that fits into one of the slots on the motherboard.

b. A disk controller card controls the hard disk and/or the floppy disk drives.

11. Network cards and their characteristics

a. A network card is a printed circuit board that fits into one of the slots on the motherboard.

b. A network card allows exchange of information and also permits a system to be connected to other computers, printers, plotters, and other peripheral devices.

c. A network card can be connected with a telephone cable, a fiber-optics cable, or by other means.

12. Power supplies and their characteristics

a. A power supply is an internal device that converts normal house current, 110 volts, into the various power demands required by a microcomputer.

Information Sheet

b. The size of the power supply required depends on the demand of the motherboard and memory, plus the cumulative demand of all add-on boards.

Example: An XT microcomputer usually has a 130 watt power supply, an AT has a 200 watt power supply, and a portable AT with a smaller motherboard and fewer add-on boards may have only a 60 watt power supply.

Parts of a CAD System
Unit 3

Assignment Sheet 1—Identify External Parts of a CAD System

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
CAD workstation sketch	______
Parts of a computer identified	______
Parts in the back of the computer identified	______
Peripheral devices identified	______

Directions: Locate a CAD workstation in the classroom or at a local industry. Sketch the CAD workstation along with the peripheral devices attached. Identify parts of the computer that can be observed. Identify plug-ins and ports on the front and back. Identify peripheral devices attached to the computer.

Parts of a CAD System
Unit 3

Assignment Sheet 2—Sketch and identify Internal Parts of a Microcomputer

Name ______________________________ Overall Rating __________

Evaluation criteria	Rating
Parts properly sketched	______
Parts properly identified	______

Directions: Your instructor will make available a microcomputer with the cover removed. Examine the internal parts of the computer. Sketch the parts in their related positions, and identify each part. Items to look for include: the power supply, motherboard, CPU, memory, hard disk, floppy disk, on/off switch, keylock, input/output cards, slots, and other items as your instructor might direct.

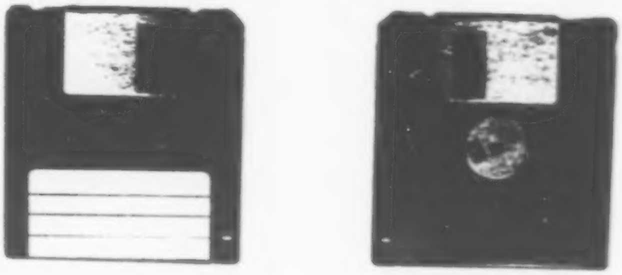
Parts of a CAD System
Unit 3

Assignment Sheet 3—Identify Type, Size, and Capacity of Selected Disks

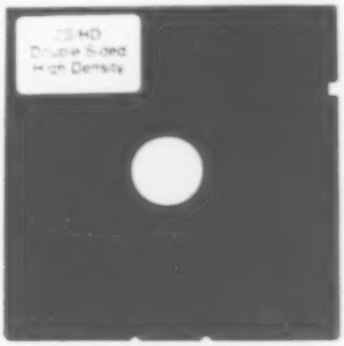
Name ______________________________ Overall Rating __________

Evaluation criteria	Rating
Disk types identified	______
Disk sizes identified	______
Disk capacities identified	______

Directions: Identify the type, size, and capacity of the disks shown below.



Type ______________ Size ______________ Capacity ______________



Type ______________ Size ______________ Capacity ______________

Disk Operating Systems
Unit 4

Objective Sheet

Unit Objective

After completing this unit, the student should be able to format and make directories on a floppy disk, create a batch file, and delete files and directories from a floppy disk. the student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to disk operating systems with their correct definitions.
2. Select true statements about guidelines for accessing directories.
3. Complete statements about the guidelines for formatting floppies and microdisks.
4. Complete a statement about the guideline for checking a disk.
5. Select true statements about guidelines for making a batch file.
6. Complete statements about deleting a file or files.
7. Complete a statement about the guideline for renaming a file.
8. Match additional DOS commands with their functions.
9. Format a floppy disk. (Assignment Sheet 1)
10. Make directories on a floppy disk. (Assignment Sheet 2)
11. Create a batch file using the Edit command. (Assignment Sheet 3)
12. Delete files and directories from a floppy disk. (Assignment Sheet 4)

Disk Operating Systems
Unit 4

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction or individual learning activities. Study the specific objectives to determine the order in which you will present the objectives.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan presentation for enrichment of exceptional students as well as accommodation of special needs students.

4. Make copies of any handouts that your plan to distribute to students.

5. Review instructions for evaluating student performance, and make copies of the Unit Evaluation Form.

Delivery and Application

6. Provide students with unit of instruction.

7. Discuss unit and specific objectives.

8. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

9. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Evaluation

10. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

11. Make copies of the written test. Add or modify test items as needed.

12. Give written test.

13. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments.

14. Reteach and retest as required.

Suggested Activities

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Introduce the unit by discussing the functions of a disk operating system (DOS) with respect to the type of computer hardware, i.e., Apple DOS, IBM DOS, etc. Skill areas: **Learning skills, learning to learn**.

2. Open up a floppy disk and show the insides of the disk. Skill areas: **Learning skills, learning to learn**.

3. Use the TREE command to show subdirectories of the hard disk. Skill areas: **Learning skills, learning to learn**.

4. Discuss with students the nature of copyright and its applications to software of all kinds. Impress upon students that illegally copying fotware is subject to penalty, and that site licensed software may not be copied except as specified in the license. Skill areas: **Learning skills**, **learning to learn**.

Resources Used in Developing This Unit

1. Forsythe, Steven. *DOS 5 Concepts and Commands*. Boston, MA: Boyd and Fraser Publishing Company, 1992.

2. Williams Ric. *Increasing your Productivity DOS*. Lake Forest, IL: Glencoe Publishing, 1992.

3. Forsythe, Steven. *An Introduction to IBM DOS*. Brea, CA: Brookside Publishing Co, 1991.

4. *Microsoft MS-DOS User's Guide and User's Reference*. Phoenix Computer Products, 1988.

Suggested Supplemental Resource

Check with the user guide on the version of DOS used with your microcomputer.

Disk Operating Systems
Unit 4

Answers to Assignment Sheets

Assignment Sheet 1 — Evaluated according to written criteria subject to materials supplied by instructor.

Assignment Sheet 2 — Evaluated according to written criteria subject to instructor verification.

Assignment Sheet 3 — Evaluated according to written criteria subject to instructor verification.

Assignment Sheet 4 — Evaluated according to written criteria subject to instructor verification.

Disk Operating Systems
Unit 4

Answers to Written Test

1. a. 2 e. 3
   b. 6 f. 7
   c. 4 g. 1
   d. 5

2. a, b, c

3. a. C:\)FORMAT A:
   b. C:\)FORMAT A:/4
   c. High-density
   d. Low-density

4. a. Disk
   b. Memory (order of a and b may be reversed if both items appear)

5. a, c

6. a. Del file name.extension
   b. Del file name.*
   c. Del *.extension
   d. Del File7???.extension

7. Ren old name.ext New name.ext

8. a. 4 e. 1
   b. 5 f. 7
   c. 2 g. 3
   d. 6

Disk Operating Systems
Unit 4

Written Test

Name ______________________________ Date __________________ Score ____________

1. Match terms on the right with their correct definition.

_______a. The main or top-level directory within a tree-structured directory system

_______b. Directories below a root directory with each subdirectory having a parent directory

_______c. The organization of a disk into sectors and tracks by creating a file allocation table (FAT) through the aligning of magnetic bits

_______d. To modify or change a line or lines of text

_______e. A program that allows the user to use DOS commands while still in another program or allows the user to use DOS commands in a more friendly manner

_______f. The flashing C:\) or A:\) symbol directing you to type in a DOS command or file name

_______g. A series of DOS commands that are acted upon or executed automatically one line at a time in the order entered

1. Batch file
2. Root directory
3. Shell
4. Format
5. Edit
6. Subdirectories
7. Prompt

2. Select true statements about guidelines for accessing directories. Place an "X" beside each true statement.

_______a. To list subdirectories and files a page at a time, type at the prompt: C:\)DIR/P.

_______b. To list subdirectories and files in a sorted order by name and to group directories, first, type at the prompt: C:\)DIR/ONG.

Written Test

_______c. To make a directory called "Elev," type at the prompt: C:\>MD ELEV

_______d. To make a directory called "Symbols," type at the prompt: C"\>Tree Symbols.

_______e. To erase a directory called "Details," type at the prompt: C:\>ED Details.

3. Complete statements about guidelines for formatting floppies and microdisks. Circle the material that best completes each of the following statements.

   a. Format low-density 5¼" floppy disks in a low-density drive by typing at the prompt: (**C:\>FORMAT A:/F:1.2**) (**C:\>FORMAT A:**).

   b. Format low-density 5¼" floppy disks in a high-density drive by typing at the prompt: (**C:\>FORMAT A:/4**) (**C:\>FORMAT A:/F:720**).

   c. Format (**high-density**) (**low-density**) 3½" microdisks in a high-density drive by typing at the prompt: C:\>FORMAT A:/F:1.44

   d. Format (**low-density**) (**high-density**) 3½" microdisks in a high-density drive by typing at the prompt: C:\>FORMAT A:/F:720

4. Complete the following statement about guidelines for checking a disk by inserting the proper word in the blank spaces: To check a disk and display (a)__________________ and (b) __________________ status reports, type at the prompt: C:\>CHKDSK.

5. Select true statements about guidelines for making batch files. Place an "X" beside each true statement.

   _______a. Use Copy Con to copy console information to a file or batch file.

   _______b. Edlin is a line oriented text editor that uses double letter commands.

   _______c. Edit is a text editor that allows use of a mouse to create, edit, and print batch files.

6. Complete statements about guidelines for deleting a file or files. Circle the material that best completes each of the following statements.

   a. To delete a single file, type at the prompt:
   (**Del file name.extension**) (**Del file *.***).

   b. To delete several files with the same file name, type at the prompt:
   (**Del file name. extension**) (**Del file name.***).

   c. To delete several files with the same extension, type at the prompt:
   (**Del file name.extension**) (**Del *.extension**).

   d. To delete several files with the same starting letters of the name but different ending characters, type at the prompt:
   (**Del *.extension**) (**Del File7???.extension**).

Written Test

7. Complete the following statement about the guideline for renaming a file. Circle the material that best completes the following statement: To rename a file, type at the prompt: (**Ren oldname*ext newname.ext**) (**Ren oldname.ext Newname.ext**).

8. Match additional DOS commands with their functions. Place the number of the DOS command in the blank beside the information that describes its function.

______a. Clears the screen

______b. Starts DOS shell

______c. Displays the amount of memory used and free memory in the system

______d. Displays the DOS version

______e. Prints a text file while you are using other DOS commands

______f. Lists DOS commands and their meanings

______g. List information about specific commands

1. PRINT
2. Mem
3. Help Command Name
4. Cls
5. Dosshell
6. VER
7. Help

***Permission to duplicate this test is granted.**

Disk Operating Systems
Unit 4

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Format a Floppy Disk Rating _____

Comments: ____

____

Assignment Sheet 2—Make Directories on a Floppy Disk Rating _____

Comments: ____

____

Assignment Sheet 3—Create a Batch File Using the Edit Command Rating _____

Comments: ____

____

Assignment Sheet 4—Delete Files and Directories From a Floppy Disk Rating _____

Comments: ____

____

Written Test Scores

Pretest _____ Posttest _____ Other _____

Other ____

____

Teacher Signature ______________________________ Date __________

Student Signature ______________________________ Date __________

***Permission to duplicate this form is granted.**

Disk Operating Systems
Unit 4

Information Sheet

1. **Terms and definitions**

   a. **Batch File** — A series of DOS commands that are acted upon or executed automatically one line at a time in the order entered

   Example: Autoexec.bat

   b. **Edit** — To modify or change a line or lines of text

   c. **Format** — The organization of a disk into sectors and tracks by creating a file allocation table (FAT) through the aligning of magnetic bits

   d. **Prompt** — The flashing C:\⟩ or A:\⟩ symbol directing you to type in a DOS command or file name

   e. **Root Directory** — The main or top-level directory within a tree-structured directory system

   f. **Shell** — A program that allows the user to use DOS commands while still in another program or allows the user to use DOS commands in a more friendly manner

   Example: DOSSHELL or Windows

   g. **Subdirectories** — Directories below a root directory with each subdirectory having a parent directory

2. **Guidelines for accessing directories**

   a. To list subdirectories and files, type at the prompt: DIR.

   Example: C:\⟩DIR or A:\⟩DIR

   b. A directory listing provides:

      (1) Filename,

      (2) Filename extension,

      (3) File size,

      (4) Date,

      (5) Time, and

      (6) Subdirectory.

Information Sheet

c. To list subdirectories and files a page at time, type at the prompt: DIR/P.

Example: C:\)DIR/P

d. To list subdirectories and files in a wide format without the size, date, and time, type at the prompt: DIR/W.

Example: C:\)DIR/W

e. To list subdirectories and files in sorted order by name and to group directories first, type at the prompt: DIR/ONG.

Example: C:\)DIR/ONG

f. To make a directory, type at the prompt: MD Name of directory (8 characters max).

Example: C:\)MD FLORPLAN

g. To change a directory, first go to the directory, and then type at the prompt: CD Name of directory to change to.

Example: C:\)CD FLORPLAN

Note: You know you are in the correct directory if the prompt looks like this: C:\)FLORPLAN)

h. To see all the directories and subdirectories on your disk, type at the prompt: TREE.

Example: C:\)TREE

i. To erase or delete a directory, the directory must be empty; to erase a directory, type at the prompt: RD Name of directory or subdirectory to erase

Example: C:\)RD FLORPLAN

3. Guidelines for formatting floppies and microdisks

a. Format low-density 5¼″ floppy disks (360K capacity) in a low-density drive by typing at the prompt: **FORMAT A:** or **FORMAT A:/F:360**.

Example: C:\)FORMAT A:

b. Format low-density 5¼″ floppy disks (360K capacity) in a high-density drive by typing at the prompt: **FORMAT A:/4** or **FORMAT A:/F:360**.

Example: C:\)FORMAT A:/F:360

Information Sheet

c. Format high-density 5¼″ floppy disks (1.2MB capacity) in a high-density disk drive by typing at the prompt: **FORMAT A:** or **FORMAT A:/F:1.2**.

Example:
```
C:\)FORMAT A:
```

d. Format low-density 3½″ microdisks (720K capacity) in a low-density disk drive by typing at the prompt: **FORMAT A:** or **FORMAT A:/F:720**.

Example:
```
C:\)FORMAT A:
```

Note: Microdisks are sometimes called floppy disks.

e. Format low-density 3½″ microdisks in a high-density drive by typing at the prompt: **FORMAT A:/T80/N:9** or **FORMAT A:/F:720**.

Example:
```
C:\)FORMAT A:\F:720.
```

f. Format high-density 3½″ microdisks in a high-density drive by typing at the prompt: **FORMAT A:** or **FORMAT A:/F:1.44**.

Example:
```
C:\)FORMAT A:/F:1.44.
```

4. **Guideline for checking a disk** — To check a disk and display disk and memory status reports, type at the prompt: CHKDSK.

Example:
```
C:\)CHKDSK

Volume MCCLAIN     created 11-15-1994 9:10p
Volume Serial Number is 179F-4430

33419264 bytes total disk space
  135168 bytes in 6 hidden files
  174080 bytes in 66 directories
31264768 bytes in 1951 user files
   51200 bytes in bad sectors
 1794048 bytes available on disk

    2048 bytes in each allocation unit
   16318 total allocation units on disk
     876 available allocation units on disk

  654336 total bytes memory
  614704 bytes free
```

Information Sheet

5. **Guidelines for making a batch file**

   a. Use Copy Con to copy console information to a file or batch file; to use copy con, at the prompt type:

```
Copy Con Name of file.bat (press enter)
DOS command (press enter)
DOS command (press enter)
(press Ctrl Z)
```

```
Example:   C:\)COPY CON CK5.bat (press enter)
           CD CADKEY5 (press enter)
           IBMVGA (press enter)
           CADKEY (press enter)
           cd\ (press enter)
           DIR (press enter)
           (press Ctrl Z)
```

   b. Edlin is a line oriented text editor used to create a file or a batch file.

   c. Edlin commands are single letters used at the asterisk (*).

   d. The most important Edlin commands are:

      (1) L—List

      (2) D—Delete

      (3) E—Exit

      (4) I—Insert

   e. To get out of the editor mode, use Ctrl C, and to use Edlin, at the prompt type:

```
EDLIN CK5.BAT (press enter)

New file

*1i

      1.   DOS command (press enter)

      2.   DOS command (press enter)

      3.   (press Ctrl C)

*e
```

Information Sheet

Example: C:\)EDLIN CK5.BAT (press enter)

*1i

1. CD CADKEY 5 (press enter)
2. IBMVGA (press enter)
3. CADKEY (press enter)
4. CD\ (press enter)
5. dir (press enter)
6. (press Ctrl C)

*e

Note: To run the batch file, type the batch file name at the prompt.

f. Edit is a text editor that allows you to create, edit, and print batch files by using either a mouse or keyboard.

g. Use the help menu and DOS manual to learn how to use Edit, then to use the editor, type at the prompt: EDIT Name of the batch file.bat

Example: C:\)EDIT CK5.bat

6. Guidelines for deleting a file or files

a. Deleting or erasing a file or files can be accomplished with or without wild cards.

Note: * and ? are wild cards.

b. To delete a single file, type at the prompt: Del file name.extension.

Example: C:\)DEL PartK.DWG

c. To delete several files with the same file name, use the * wild card by typing at the prompt: Del file name.*

Example: A:\)Del PartK.*

d. To delete several files with the same extension, use the * wild care by typing at the prompt: Del *.extension.

Example: A:\)Del *.DWG

e. To delete several files with the same starting letters of the name but different ending characters, use the ? wild card for the missing characters and type at the prompt: Del File7???.extension.

Example: `C:\)del file7???.PRT`

7. **Guideline for renaming a file** — To rename a file, type at the prompt: Ren OldName.ext. NewName.ext

Example:
```
C:\)REN DRAW6789.BAK DRAW6789.DWG or
C:\)REN DRAW6789.DWG DRAW6888.DWG
```

8. **Additional DOS commands and their functions**

a. Cls — Clears the screen

b. Dosshell — Starts DOS shell

c. Mem — Displays the amount of memory used and free memory in the system

d. VER — Displays the DOS version

e. PRINT — Prints a text file while you are using other DOS commands

f. Help — Lists DOS commands and their meanings

g. Help Command Name — List information about specific commands

Example: `HELP FORMAT`

Disk Operating Systems
Unit 4

Student Supplement 1—MS-DOS® Version 5 Help Command Names

MS-DOS® Version 5 is a registered trademark of the Microsoft Corporation. Presentation of the following commands is intended to benefit the Microsoft Corporation. There is no intent to infringe upon materials trademarked and/or copyrighted, and the administration of all privileges of trademark/copyright are properties of the owner.

Note: To execute any of the following DOS 5 commands, at the C:\) prompt, type HELP followed by the command as in the example: C:\)HELP FORMAT. Commands with * are ones most frequently used.

APPEND	Allows programs to open data files in specified directories as if they were in the current directory.
ASSIGN	Redirects requires for disk operations on one drive to a different drive.
ATTRIB	Displays or changes file attributes.
BACKUP	Backs up one or more files from one disk to another.
BREAK	Sets or clears extended CTRL+C checking.
CALL	Calls one batch program from another.
*CD	Displays the name of or changes the current directory.
CHCP	Displays or sets the active code page number.
CHDIR	Displays the name of or changes the current directory.
CHKDSK	Checks a disk and displays a status report.
*CLS	Clears the screen.
COMMAND	Starts a new instance of the MS-DOS command interpreter.
COMP	Compares the contents of two files or sets of files.
COPY	Copies one or more files to another location.
CTTY	Changes the terminal device used to control your system.
DATE	Displays or sets the date.
DEBUG	Runs Debug, a program testing and editing tool.
*DEL	Deletes one or more files.
*DIR	Displays a list of files and subdirectories in a directory.
DISKCOMP	Compares the contents of two floppy disks.
DISKCOPY	Copies the contents of one floppy disk to another.
DISKEY	Edits command lines, recalls MS-DOS commands, and creates macros.
*DOSSHELL	Starts MS-DOS Shell.
ECHO	Displays messages, or turns command echoing on or off.
*EDIT	Starts MS-DOS Editor, which creates and changes ASCII files.
*EDLIN	Starts Edlin, a line-oriented text editor.
EMM386	Turns on or off EMM386 expanded memory support.

Student Supplement 1

*ERASE	Deletes one or more files.
EXE2BIN	Converts .EXE (executable) files to binary format.
EXIT	Quits the COMMAND.COM program (command interpreter).
EXPAND	Expands one or more compressed files.
FASTOPEN	Decreases the amount of time needed to open frequently used files and directories.
FC	Compares two files or sets of files, and displays the differences between them.
FDISK	Configures a hard disk for use with MS-DOS.
FIND	Searches for a text string in a file or files.
FOR	Runs a specified command for each file in a set of files.
*FORMAT	Formats a disk for use with MS-DOS.
GOTO	Directs MS-DOS to a labeled line in a batch program.
GRAFTABL	Enable MS-DOS to display an extended character set in graphics mode.
GRAPHICS	Loads a program that can print graphics.
HELP	Provides Help information for MS-DOS commands.
IF	Performs conditional processing in batch programs.
JOIN	Joins a disk drive to a directory on another drive.
KEYB	Configures a keyboard for a specific language.
LABEL	Creates, changes, or deletes the volume label of a disk.
LH	Loads a program into the upper memory area.
LOADFIX	Loads a program above the first 64K of memory, and runs the program.
LOADHIGH	Loads a program into the upper memory area.
MD	Creates a directory.
*MEM	Displays the amount of used and free memory in your system.
MIRROR	Records information about one or more disks.
MKDIR	Creates a directory.
MODE	Configures a system device.
MORE	Displays output one screen at a time.
NLSFUNC	Loads country-specific information.
PATH	Displays or sets a search path for executable files.
PAUSE	Suspends processing of a batch file and displays a message.
*PRINT	Prints a text file while you are using other MS-DOS commands.
PROMPT	Changes the MS-DOS command prompt.
QBASIC	Starts the MS-DOS QBasic programming environment.
*RD	Removes a directory.
RECOVER	Recovers a readable information from a bad or defective disk.
REM	Records comments (remarks) in batch files or CONFIG.SYS.
REN	Renames a file or files.
RENAME	Renames a file or files.
REPLACE	Replaces files.
RESTORE	Restores files that were backed up by using the BACKUP command.
RMDIR	Removes a directory.
SET	Displays, sets, or removes MS-DOS environment variables.
SETVER	Sets the version number that MS-DOS reports to a program.
SHRE	Installs file-sharing and locking capabilities on your hard disk.

Student Supplement 1

SHIFT	Shifts the position of replaceable parameters in batch files.
SORT	Sorts input.
SUBST	Associates a path with a drive letter.
SYS	Copies MS-DOS system files and command interpreter to a disk you specify.
TIME	Displays or sets the system time.
*TREE	Graphically displays the directory structure or a drive or path.
TYPE	Displays the contents of a text file.
UNDELETE	Recovers files which have been deleted.
UNFORMAT	Restores a disk erased by the FORMAT command or restructured by the RECOVER command.
VER	Displays the MS-DOS version.
VERIFY	Tells MS-DOS whether to verify that your files are written correctly to a disk.
VOL	Displays a disk volume label and serial number.
XCOPY	Copies files (except hidden and system files) and directory trees.

Disk Operating Systems
Unit 4

Assignment Sheet 1—Format a Floppy Disk

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Typed correct command to format a disk	______
Correctly placed disk into disk drive	______
Correctly formatted disk	______

Directions:

1. At the C prompt (C:\)) type the command to format a ________________ type disk and press enter. (Instructor assigns disk)

2. When indicated by the computer, insert your floppy disk into the correct disk drive assigned by your instructor.

3. After the disk is formatted, fill in the blanks below by copying information provided by your computer.

   a. ________________ bytes total disk space

   b. ________________ bytes availabe on disk

   c. ________________ bytes in each allocation unit

   d. ________________ allocation units available on disk

   e. Volume serial number is ________________

Disk Operating Systems
Unit 4

Assignment Sheet 2—Make Directories on a Floppy Disk

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Made directories on a floppy disk	______
Made subdirectories on a floppy disk	______
Erased subdirectories on a floppy disk	______

Directions:

1. Using a formatted disk, place the disk in a disk drive.
2. Make the following directories on the root directory.

   CADD
   Drawing2
   ARCHDWG6
   Detail99
   Struct57
   Elect003

3. Make the following subdirectories under each directory.

   ROOT Directory: subdirectories

   CADD
   - Symbols
     - Flowchrt
     - Elect
     - Plumbing
     - Furnitur
       - Table
       - Chair

   DETAIL99
   - Detail12
   - Detail14
   - Detail34
   - Detail89
     - section6
     - section9
   - Detail43

4. Erase directory Struct57.
5. Erase directory Detail89
6. Turn in disk to be checked by instructor.

Disk Operating Systems
Unit 4

Assignment Sheet 3—Create a Batch File Using the Edit Command

Name ____________________ Overall Rating __________

Evaluation criteria	**Rating**
Typed correct command to edit a new file	______
Typed a batch file	______
Saved a batch file	______
Ran a batch file	______

Directions:

1. Change to the A drive and at the A prompt (A:\\)) type: A:\\)Edit nameprit.bat.
2. When in the editor, type:

```
cls
echo            This is a test
echo            to see if I can
echo            print my name.
echo            type your name
pause
```

3. Save the file.
4. Exit the editor.
5. Type the batch file name: A:\\)nameprit
6. Print out the results of the batch file below.

7. Create three additional files with different file names and different messages.

Disk Operating Systems
Unit 4

Assignment Sheet 4—Delete Files and Directories From a Floppy Disk

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Typed correct command to delete a file	______
Typed the correct command to delete a directory	______

Directions:

1. Insert disk used in Assignment Sheets 1-3 in disk drive A.
2. Delete the directory called table.
3. Delete two of the three created files from Assignment Sheet 3.

CAD Software
Unit 5

Objective Sheet

Unit Objective

After completing this unit, the student should be able to create a boot disk, boot an operating system, and run a DOS utility program. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to CAD software with their correct definitions.
2. Select true statements about operational software and its functions.
3. Complete statements about parts and functions of a window environment.
4. Select true statements about third party utility software and its uses.
5. Complete statements about microcomputer applications software use by CAD operators.
6. Create a boot DOS disk. (Assignment Sheet 1)
7. Boot an operating system. (Assignment Sheet 2)
8. Run a DOS utility program. (Assignment Sheet 3)

CAD Software
Unit 5

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction or individual learning activities. Study the specific objectives to determine the order in which you will present the objectives.

2. Review teaching suggestions section that follows. Plan for classroom activities.

3. Plan presentation for enrichment of exceptional students as well as accommodation of special needs students.

4. Make a transparency from the transparency master included with this unit. This appears in the teacher guide only and is designed to be used with the following objectives:

   TM 1—Software Trademarks (Objectives 1, 2, 4, & 5)

5. Make copies of any handouts that you plan to distribute to students.

6. Review instructions for evaluating student performance, and make copies of the unit evaluation form.

Delivery and Application

7. Provide students with unit of instruction.

8. Discuss unit and specific objectives.

9. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

10. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Evaluation

11. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

12. Make copies of the written test. Add or modify test items as needed.

13. Give written test.

Suggested Activities

14. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments.

15. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Introduce the unit by showing the transparency or copies of the software trademarks. Have the students try to guess the name of the software and its application. Skill area: **Learning skills**, **learning to learn**.

2. Bring out the original boxes and instructions with various CAD software. Include word processing, spread sheets, presentation graphics, and data base software. Skill area: **Learning skills**, **learning to learn**.

3. Provide a demonstration of all of the CAD software in the laboratory. Skill area: **Communication skills, listening**.

4. Use Transparency 1 to discuss CAD software. Skill area: **Communications skills, listening**.

Resources Used in Developing This Unit

1. Bertoline, Gary R. *Fundamentals of CAD*. Columbus, OH: Delmar Publishers Inc., 1988.

2. Goetsch, David L. *Microcadd Computer-Aided Design and Drafting on Microcomputers*. Englewood Cliff, NJ: Prentice Hall, 1988.

3. Giesecke, Frederick E., et. al. *Technical Drawing*, 9th ed. New York, NY: Macmillan Publishing Company, 1991.

4. Forsythe, Steven. *DOS 5 Concepts and Commands*. Boston, MA: Boyd and Fraser Publishing Company, 1993.

Suggested Activities

Suggested Supplemental Resources

1. Have the students tour computer shops looking for CAD software.
2. Have the students keep a list of CAD software including its cost and system requirements.
3. Have the students read and prepare a list of the hardware requirements of three software packages used in the laboratory.

CAD Software
Unit 5

Answers to Assignment Sheets

Assignment Sheet 1

Instructor will examine students Boot DOS Disk to see if the Command.COM files on the disk and if the Volume Label is the students name. Also check disk Label to see if SYSTEMS DISK is marked and Version number is marked.

Assignment Sheet 2

Instructor will observe student turning on the computer for a cold boot and conducting a warm boot.

6. What is the memory of the system? — Answer will vary
7. What is the date? — Answer will vary
8. What is the time? — Answer will vary
12. What is the Version? — Answer will vary

Assignment Sheet 3

8. What is the advantage of using DOS utility rather then the DOS command by itself?

Answer: You may pick and select with the mouse rather then typing in the commands. The DOS utility provides a friendly and easy method to use DOS.

CAD Software
Unit 5

Answers to Written Test

1. a. 3 e. 6
   b. 7 f. 5
   c. 4 g. 2
   d. 1

2. c, d

3. a. All work
   b. Can
   c. Before
   d. Top

4. a, c

5. a. Letters
   b. Spread sheet
   c. 3D, detailing
   d. Camera-ready
   e. Store
   f. Computer Numerical Control
   g. Calculate
   h. Instructions

CAD Software
Unit 5

Written Test

Name________________________________ Date _______________ Score ______________

1. Match the terms on the right with their correct definitions.

______a. A program designed to be user friendly to an operator who uses the software to perform a specific task or tasks or to solve a problem

______b. A system used to interconnect computer systems to facilitate the exchange of data and information between systems

______c. DOS commands loaded into RAM and operated directly from their location in RAM rather than from the disk when the system is booted

______d. Used to control the operation of the computer (CPU) and peripheral devices

______e. A set of program instructions created by the operator to improve, speed up, or enhance the application software

______f. Programs designed to assist the operator in managing the computer with user friendly commands

______g. DOS commands that reside on the hard disk and must be copied into RAM before a command can operate

1. Operational Software
2. External Commands
3. Application Software
4. Internal Commands
5. Utilities
6. User Software
7. Local Area Network

2. Select true statements about operational software and its functions. Place an "X" beside each true statement.

______a. The disk operating system most commonly used in minicomputer CAD Systems is IBM DOS or Microsoft DOS.

______b. The UNIX operating system is used in CAD workstations using microcomputers and mainframe computers.

Written Test

______c. Windows is an operating system utility that can be run in a DOS, OS2, or UNIX operating system.

______d. Application software must be specifically written to run in a windows environment.

3. Complete statements about parts and functions of a window environment. Circle the material that best completes each of the following statements.

   a. A window is a rectangular area where an operator performs (**DOS**) (**all work**).

   b. Several windows can be displayed at once and work (**cannot**) (**can**) be performed between windows.

   c. Windows must be installed (**after**) (**before**) installing windows applications.

   d. A common menu bar is displayed at the (**top**) (**bottom**) of the window that allows selection from several alternatives.

4. Select true statements about third party utilities software and its uses. Place an "X" beside each true statement.

   ______a. Third party utility software is software developed by a company other then the developer of the disk operating system.

   ______b. Third party utility software is designed to make the disk operating system more efficient, but it is seldom user friendly.

   ______c. When using a mouse with utilities, you can point and pick from a menu rather than typing in commands from the keyboard.

5. Complete statements about microcomputer application software used by CAD operators. Circle the material that best completes each of the following statements.

   a. Word Processing is used for (**drawings**) (**letters**) reports, and publishing.

   b. Presentation Graphics are used to produce graphs and charts using data from a (**spread sheet**) (**word processor**).

   c. CAD is used for 2D multiview drawings, (**3D**) (**2D**) wireframe construction, design, (**letters**) (**detailing**), design layouts, and solid modeling.

   d. Desktop publishing is used to produce (**camera-ready**) (**programs for**) text and graphics for publishing.

Written Test

e. A database is used to (**store**) (**calculate**) interrelated information such as, addresses, materials lists, and standard parts libraries.

f. Computer Aided Manufacturing software generally means software capable of producing "G" codes necessary for (**Computer Numerical Control**) (**Computer Aided Designs**).

g. A Spread Sheet is used to make tabular, numerical information in a chart form that is easy to (**store**) (**calculate**).

h. Programming languages are used to create a set of (**instructions**) (**drawings**) to solve a problem in a short amount of time.

***Permission to duplicate this test is granted.**

CAD Software
Unit 5

Unit Evaluation Form

Student Name ______________________________ Unit Rating ________

Assignment Sheet 1—Create a Boot DOS Disk Rating______

Comments: ______________________________

____

Assignment Sheet 2—Boot an Operating System Rating______

Comments:______________________________

____

Assignment Sheet 3—Run a DOS Utility Program Rating______

Comments:______________________________

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ______________________________

____

Teacher Signature ______________________________ Date ________

Student Signature ______________________________ Date ________

Permission to duplicate this form is granted.

Software Trademarks

American
Small Business Computers

DesignCAD®

DesignCAD® is a registered trademark of American Small Business Computers, Pryor, Oklahoma.

INTERGRAPH

MicroStation®

Microstation® is a registered trademark of Bentley Systems, Inc., an Intergraph Corporation afilliate, Huntsville, Alabama.

AUTODESK, INC.

AutoCAD®

AutoCAD® is a registered trademark of AUTODESK, INC., Sausalito, California.

CADKEY®

CADKEY® is a registered trademark of Cadkey, Inc., Windsor, Connecticut.

CAD Software
Unit 5

Information Sheet

1. **Terms and definitions**

   a. **Application Software** — A program designed to be user friendly to an operator who uses the software to perform a specific task or tasks or to solve a problem

   Examples: AutoCAD®, CADKey®, Microsoft Works®, and Excell®

   b. **External Commands** — DOS commands that reside on the hard disk and must be copied into RAM before a command can operate

   Example: Diskcopy—Copies the contents of a diskette to another diskette.

   c. **Internal Commands** — DOS commands loaded into RAM and operated directly from their location in RAM rather than from the disk when the system is booted

   Example: CLS—clears the Screen, VER—displays the DOS version, DIR—displays the directory's files and subdirectories, COPY—copies one or more files to another location.

   d. **Local Area Network (LAN)** — A system used to interconnect computer systems to facilitate the exchange of data and information between systems

   e. **Operational Software** —Used to control the operation of the computer (CPU) and peripheral devices (sometimes called system software)

   Examples: DOS, OS/2®, and UNIX® operating systems

   f. **User Software** — A set of program instructions created by the operator to improve, speed up, or enhance the application software.

   Examples: BASIC®, PASCAL®, "C"®, FORTRAN®, AUTOLISP®, CADL®, MACROS®, User Created Symbols, and Parametric Programs

Disclaimer

Software samples are presented in this unit for the purpose of reference and for the benefit of their owners. Trademark notation has been included to indicate that referenced materials are the properties of their respective owners.

Information Sheet

g. **Utilities** — Programs designed to assist the operator in managing the computer with user friendly commands

Examples: Norton Utilities®, PC Tools®, Windows®, and DOSShell®

2. **Operational Software and its functions**

a. The disk operating systems most commonly used in microcomputer CAD Systems are IBM DOS®, Microsoft DOS®, or IBM OS/2®.

Note: IBM DOS® and OS/2® are registered trademarks of the International Business Machines Corporation. MS-DOS® is a registered trademark of the Microsoft Corporation.

b. The UNIX® operating system is used in CAD workstations using minicomputers and mainframe computers.

UNIX® is a registered trademark of the AT&T Corporation.

c. Windows is an operating system utility that can be run in a DOS®, OS/2®, or UNIX® operating system.

d. Application software must be specifically written to run in the windows environment.

3. **Parts and functions of a window utility environment**

a. A window is a rectangular area where an operator performs all work.

b. A common menu bar is displayed at the top of the window that allows selections from several alternatives.

c. Several windows can be displayed at once and work can be performed between windows.

d. Windows must be installed before installing windows applications.

Example: Install Microsoft Windows then install Microsoft Word® for windows, Excell® for windows, AutoCAD® for windows, etc.

4. **Third party utilities software and its uses**

a. Third party utility software is software developed by a company other than the developer of the disk operating system.

Information Sheet

b. Third party utility software is designed to make the disk operating system more user friendly and easier to operate.

Examples: PC Tools®, Norton Utilities®, Copy II PC®, Q-DOS®, DOSShell®

c. When using a mouse with utilities, you can point and pick from a menu rather than typing in commands from the keyboard.

5. **Microcomputer applications used by CAD operators**

a. **CAD** is used for 2D multiview drawings, 3D wireframe construction, design, detailing, design layouts, and solid modeling

b. **World Processing** is used for letters, reports, and publishing

Examples: PFS ProWrite®, WordPerfect®, Microsoft Word®, Enable®, Q and A®

c. A **Data Base** is used to store interrelated information such as addresses and standard parts libraries

Examples: dBase®, Enable®, Paradox®, Q and A®

d. A **Spread Sheet** is used to make tabular, numerical information in a chart form that is easy to calculate

Examples: Excell®, Enable®, Lotus 1-2-3®, Plan Perfect®

e. **Presentation Graphics** are used to produce graphics and charts using data from a spread sheet

Examples: Lotus 1-2-3®, Harvard Graphics®, Enable®, Excell®, Corel Draw®

f. **Computer Aided Manufacturing (CAM)** is software generally capable of producing "G" codes necessary for Computer Numerical Control machines to operate

Examples: MasterCAM®, SmartCAM®

g. **Desktop Publishing** is used to produce camera-ready text and graphics for publishing

Examples: Ventura Publisher®, Pagemaker®, Microsoft Publisher®

Information Sheet

h. **Programming Languages** are used to create a set of instructions to solve a problem in a short amount of time

Examples: FORTRAN®, BASIC®, PASCAL®, and C®.

NOTE: Their are over 200 programming languages used for communicating with computers. A drafter does not need to be a programmer to be a CAD operator; however, learning the basics of a programming language will make a more useful employee.

CAD Software
Unit 5

Assignment Sheet 1—Create a Boot DOS Disk

Name ______________________________ Overall Rating __________

Evaluation Criteria	**Rating**
Created a boot DOS disk	______
Tested boot DOS disk	______

Directions: Obtain a blank 3½ HD disk from your instructor. Copy the computer operating system files to the blank disk. Test the boot disk in the computer.

Procedure:

1. Insert a blank disk in drive A.

2. At the C prompt Type:

```
C:\FORMAT A:/S/F:1.44MB
          |  | |  |
          |  | |  |__SIZE OF FLOPPY DISK
          |  | |__FORMAT
          |  |__SYSTEM FILES
          |__Drive A
```

3. Type in your name for the Volume Label.

4. Look at the file on the disk by doing a DIR. The directory should be:

   COMMAND. COM

5. Mark on the disk label SYSTEMS DISK.

6. Test the system disk by turning off the computer; place the SYSTEMS DISK in disk drive A and turn the computer back on.

   NOTE: This is called a cold boot.

Assignment Sheet 1

7. If the system asks for the current date press enter. If the system asks for the current time press enter.

8. The system should tell you what version of DOS is loaded. Mark on the disk label below SYSTEM DISK the version of DOS.

CAD Software
Unit 5

Assignment Sheet 2—Boot an Operating System

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Cold Booted system successfully	______
Warm booted system successfully	______

Directions: By turning on the computer you perform a cold boot of the system. If the system has already been turned on and you press Ctrl, Alt, and Del Keys all at once you perform a warm boot. To boot a system means to cause the loading of the operating system from the hard disk or from a system disk like you created in Assignment Sheet 1.

Procedures:

1. Make sure all peripheral equipment is turned on.

   Example: Monitor, printer, plotter, graphics tablet.

2. Cold boot by flipping the switch on the computer so that the instructions in the ROM BIOS (basic input/output system) are executed.

3. Look for a KB message on the screen. This indicates the computer's memory is being tested, the input and output devices connected are checked to verify that these devices work. As the diskette drives and hard disk are checked, a light flashes on and off. The operating system is copied into RAM. The files Command.com, Config.sys, and Autoexec.bat are read into the system.

4. Listen for one beep. This means the computer has successfully completed its internal self-test and setup.

5. If you have a hard disk, the time and date are automatically read into the system. If you load from the SYSTEM DISK, the date and time will need to be entered by the operator.

6. At the C prompt type in MEM.

   What is the memory of the system?________________

Assignment Sheet 2

7. At the C prompt type in DATE.

   What is the date?__________________

8. At the C prompt type in TIME.

   What is the time?__________________

9. Warm boot the system by holding down Ctrl, Alt, and Del Keys all at one time.

   Note: Warm booting prevents the electronic components from thermal expansion fatigue. When electronic components are cold then hot then cold then hot, they expand and contract causing material failure. It is better to leave the system on a long period of time rather than turn it on and off at short intervals.

10. At the A prompt type in DATE.

11. At the A prompt type in TIME.

12. What is the DOS Version?__________________

CAD Software
Unit 5

Assignment Sheet 3—Run a DOS Utility Program

Name ______________________________ Overall Rating __________

Evaluation Criteria	**Rating**
Loaded DOS utility program	______
Used mouse to select entries	______
Used Directory, and Delete commands	______
Exited DOS utility program	______

Directions: Ask you instructor for access to a DOS utility program such as PC Tools, Norton utility, DOSShell, etc. Use the utility to look at directories, and delete some files.

Procedure: (DOSShell example)

1. Create 3 files on SYSTEM DISK.
   a. At the C prompt type EDIT Test1.bat

      ```
      C:\EDIT Test1.bat
      ```

   b. While in the edit screen go to the file and save. Exit the Edit screen by going to File and exit.
   c. Repeat the commands to create Test2.bat, and Test3.bat.
2. At the C prompt type DOSShell.

   ```
   C:\DOSShell
   ```

3. When the DOSShell utility comes up, move the mouse around to see if you have mouse control.
4. Pick [A:] to get the directory list of the files created on the SYSTEM DISK.
5. Pick one of the created files. The file will be highlighted after it is picked.

Assignment Sheet 3

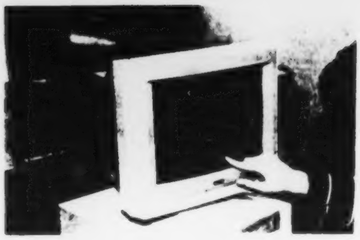
6. Select file then select Delete. A popup window in the middle of the screen asks you "Delete File Confirmation" answer YES by picking Yes.

7. Continue deleting the other two files.

8. What is the advantage of using a DOS utility rather than the DOS command by itself?

____

____



Types of Files
Unit 6

Objective Sheet

Unit Objective

After completing this unit, the student should be able to use DOS, CAD, and specialized file extensions for popular CAD software programs. The student should demonstrate these competencies by completing the assignment sheet and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to types of files with their correct definitions.
2. Match extensions used in a DOS environment with their applications.
3. Match extensions with their CAD system applications.
4. Complete statements about extensions for specialized files and their applications.
5. Correct file type extensions. (Assignment Sheet 1)

Types of Files
Unit 6

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction or individual learning activities. Study the specific objectives to determine the order in which you will present the objectives.

2. Review teaching suggestions section that follows. Plan for classroom activities.

3. Plan presentation for enrichment of exceptional students as well as acomodation of special needs students.

4. Make transparencies from transparency masters included with this unit. These appear in the teacher guide only and are designed to be used with the following objectives:

   TM1—DOS File Extensions (Objective 2)
   TM2—CAD File Extensions (Objective 3)
   TM3—Specialized File Extensions (Objective 4)

5. Make copies of any handouts that you plan to distribute to students.

6. Review instructions for evaluating student performance, and make copies of the unit evaluation form.

Delivery and application

7. Provide students with unit of instruction.

8. Discuss unit and specific objectives.

9. Discuss information sheet. Implement teaching plan to localize, supplement, and personalized the unit.

10. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Evaluation

11. Discuss the use of the unit evaluation form with students. Discuss the rating scale that will be used for student evaluation.

12. Make copies of the written test. Add or modify test items as needed.

Suggested Activities

13. Give written test.

14. Compile assignment sheet ratings and written test scores on the unit evaluation form. Include any additional assignments.

15. Reteach and retest as required.

Teaching Suggestions

1. Introduce the unit by discussing the importance of being able to recognize different CAD file types. Skill area: **Communication, listening**.

2. Explain why different file types are not readable as are Text files. Skill area: **Communication, listening**.

3. Use Transparency 1 to discuss DOS file extensions. Skill area: **Learning skills, learning to learn**.

4. Use Transparency 2 to discuss CAD file extensions. Skill area: **Learning skills, learning to learn**.

5. Use Transparency 3 to discuss Specialized file extensions. Skill area: **Learning skills, learning to learn**.

Resources Used in Developing This Unit

1. Giesecke, Frederick E., et. al. *Technical Drawing*, 9th ed. New York: Macmillan Publishing Company, 1991.

2. Forsythe, Steven. *DOS 5 Concepts and Commands*. Boston, MA: Boyd and Fraser Publishing Company, 1993.

3. Rice, H. and D. Raker. *The Microcomputer CAD Manual*. Thousand Oaks, CA: New Riders Publishing, 1987.

4. Conforti, Frank. *Inside MicroStation*, 2nd ed. Chamisal, NM: On Word Press, 1991.

5. *DesignCAD 3-D Reference*. Pryor, OK: American Small Business Computers, Inc., no date.

6. *FastCAD User's Guide*. Tempe, AZ: Evolution Computing, no date.

7. Fuller, James E. *Using AutoCAD*, 4th ed. Albany, NY: Delmar Publishers Inc., 1991.

Suggested Activities

Suggested Supplemental Resources

1. DOS Reference Manual

2. CAD Software Manual

Types of Files
Unit 6

Answers to Assignment Sheet

Assignment Sheet 1

1. FRAME45.DWG
2. Part3994.PRT
3. Autoexec.bat
4. ANSI.sys
5. CLINE.LSP
6. Windel.MAC
7. HP550C.DRV
8. Picture.PCX
9. ROBOT44.DGN
10. 985777B4.DXF
11. ACAD.EXE
12. README.DOC
13. Command.COM
14. PARTX45.IGS
15. BLOCK49.FCD

Types of Files
Unit 6

Answers to Written Test

1. a. 2
   b. 4
   c. 1
   d. 8
   e. 6
   f. 3
   g. 5
   h. 7

2. a. 3
   b. 4
   c. 1
   d. 2

3. a. 2
   b. 1
   c. 2
   d. 1
   e. 2
   f. 3
   g. 5
   h. 4

4. a. .DRV
   b. .DOC
   c. transferring
   d. .BAC backup
   e. .IGS
   f. .FNT font

Types of Files
Unit 6

Written Test

Name ______________________________ Date __________ Score __________

1. Match the terms on the right with their correct definitions.

_____a. A reference title one to eight characters long with no spaces, commas, backslashes, or periods

_____b. Files that contain computer programs that start applications or execute DOS commands

_____c. A collection of related information stored in a memory location on a hard disk, floppy disk, or storage media

_____d. Text files containing DOS commands that can be organized and run like a program

_____e. Files that contain only text using the American Standard Code for Information Interchange (ASCII)

_____f. One to three characters following the file name and a period

_____g. Files created and used exclusively with an application software package

_____h. Files that contain information that sets up computer system hardware when the system is turned on

1. File
2. File name
3. Extension
4. Program Files
5. Specialized Data Files
6. Unformatted Text Files
7. System Files
8. Batch Programs

Written Test

2. Match extensions used in a DOS environment with their applications. Place the number beside the extension in the blank beside the application.

______a. Executable files that contain DOS programs

______b. Command files that contain DOS programs

______c. Systems files containing information to operate the computer hardware

______d. Batch files containing a list of DOS commands that execute one command at a time

1. .SYS
2. .BAT
3. .EXE
4. .COM

3. Match extensions with their CAD system applications. Place the number beside the system in the blank beside the correct extension.

______a. Frame.PTN is a specialized pattern or symbol data file.

______b. Cline.LSP is an AutoLisp program file.

______c. BOX25346.CDL is a drawing interchange file for transferring files to other micro computer CAD or CAM systems.

______d. PART8934.DWG is a specialized drawing data file.

______e. PART7456.PRT is a specialized drawing data file.

______f. FLANGE34.FCD is a specialized drawing data file.

______g. Bracket5.DC3 is a specialized drawing data file.

______h. Tank986B.DGN is a specialized drawing data file.

1. AutoCAD
2. CADKEY
3. FastCAD
4. MicroStation
5. DesignCAD 3D

Written Test

4. Complete statements about extensions for specialized files and their applications. Circle the material that best completes each of the following statements.

   a. The extension (**.DRV**) (**.EXE**) is used for driver files for graphics cards, plotters, printers, etc.

   b. The extension (**.IGS**) (**.DOC**) is used for document text files.

   c. The extension .DXF is used for drawing interchange for (**transferring**) (**listing**) files to other micro-computer CAD or CAM system.

   d. The extension (**.BAC**) (**.DOC**) is used for (**backup**) (**interchange**) files.

   e. The extension (**.HLP**) (**.IGS**) is used for drawing interchange for transferring files to mini or mainframe CAD or CAM file systems.

   f. The extension (**.MNU**) (**.FNT**) is used for (**Font**) (**Overlay**) files.

***Permission to duplicate this test is granted.**

Types of Files
Unit 6

Unit Evaluation Form

Student Name ______________________________ Unit Rating __________

Assignment Sheet 1—Correct file type extensions Rating ______

Comments: ____

____

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ____

____

Teacher Signature ______________________________ Date __________

Student Signature ______________________________ Date __________

*Permission to duplicate this form is granted.

DOS File Extensions

.EXE	Executable Files
.COM	Command Files
.SYS	System Files
.BAT	Batch Files

CAD File Extensions

CAD Software	Extensions	Usage
AutoCAD®	.DWG	Drawing Data File
	.LSP	AutoLisp Program
CADKEY®	.PRT	Drawing Data File
	.PTN	Pattern Data File
	.CDL	CADKEY Design Language
FastCAD®	.FCD	Drawing Data Files
	.MAC	Macro File
MicroStation®	.DGN	Drawing Data Files
	.MA	MicroStation Development Language
DesignCAD®	.DC3	Drawing Data Files
	.PCX	Screen Image File

AutoCAD® is a registered trademark of Autodesk Inc. CADKEY® is a registered trademark of Cadkey, Inc. FastCAD® is a registered trademark of Evolution Computing. Microstation® is a registered trademark of the Intergraph Corporation. DesignCAD® is a registered trademark of American Small Business Computers.

Specialized File Extensions

.DXF	Drawing Interchange File
.IGS	Drawing Interchange File
.DRV	Driver Files
.DOC	Document Text Files
.BAC	Back Up Files
.OVL	Overlay Files
.MNU	Menu File
.HLP	Help File
.FNT	Font File

Types of Files
Unit 6

Information Sheet

1. **Terms and definitions**

   a. **Batch Programs** — Text files containing DOS commands that can be organized and run like a program

   Example: AUTOEXEC.BAT

   b. **Extension** — One to three characters following the file name and a period

   Note: EXE, COM, SYS, BAT, and DWG are examples of extensions. AUTOEXEC.BAT, CONFIG.SYS, Command.COM, and FLORPLAN.DWG are examples of file names with extensions. Notice the period separating the file name from the extension. A file name does not have to have an extension.

   c. **File** — A collection of related information stored in a memory location on a hard disk, floppy disk, or storage media

   d. **File Name** — A reference title one to eight characters long with no spaces, commas, backslashes, or periods

   Examples: AUTOEXEC, CONFIG, ACAD, File34

   e. **Program Files** — Files that contain computer programs that start applications or execute DOS commands

   Example: Program files usually run or execute by typing the file name that has an .EXE or .COM extension. WP.EXE starts WordPerfect software. ACAD.EXE starts AutoCAD software.

   f. **Specialized Data Files** — Files created and used exclusively with an application software package

   Example: dBase IV uses .DBF extension, AutoCAD uses .DWG, CADKEY uses .PRT, and Lotus 1-2-3 uses .WK1.

   g. **System Files** — Files that contain information that sets up computer system hardware when the system is turned on

   Examples: Config.sys, ANSI.SYS

Information Sheet

h. **Unformatted Text Files** — Files that contain only text using the American Standard Code for Information Interchange (ASCII)

Examples: README.txt, Read.me, README.DOC

2. **Extensions used in a DOS environment and their applications**

a. **.EXE** — Executable files that contains DOS

b. **.COM** — Command files that contains DOS programs

c. **.SYS** — System files containing information to operate the computer hardware

d. **.BAT** — Batch files containing a list of DOS commands that execute one command at a time

3. **Extensions and their CAD system applications**

a. AutoCAD®

(1)	.DWG	Specialized drawing data file for AutoCAD
(2)	.LSP	AutoLisp program file

Note: AutoLisp is a programming language used by AutoCAD. You can view the program by typing at the C prompt: C:\TYPE Name.LSP

b. CADKEY®

(1)	.PRT	Specialized drawing data files for CADKEY
(2)	.PTN	Specialized pattern or symbol data files for CADKEY
(3)	.CDL	CADKEY Design Language (CDL) file used for drawing interchange file (transferring files) to other micro-computer CAD or CAM systems.

Note: CDL is a programming language used by CADKEY. You can view the program by typing at the C prompt: C:\TYPE Name.CDL

c. FastCAD®

(1)	.FCD	Specialized drawing data files for FastCAD
(2)	.MAC	Macro definition file for FastCAD

Information Sheet

d. MicroStation®

(1)	.DGN	Specialized drawing data files for MicroStation
(2)	.MA	MicroStation Development Language (MDL) is a programming language used to customize MicroStation

e. DesignCAD®

(1)	.DC3	Specialized drawing data files for DesignCAD 3-D
(2)	.PCX	Screen Image file for DesignCAD 3-D

4. Extensions for specialized files and their applications

a.	.DXF	Drawing interchange file for transferring files to other microcomputer CAD or CAM systems
b.	.IGS	Initial Graphics Exchange Specification (IGES) drawing interchange file for transferring files to mini or mainframe CAD or CAM systems
c.	.DRV	Driver files for graphics card, plotter, printer, etc.
d.	.DOC	Document text files
e.	.BAC	Backup files
f.	.OVL	Overlay file for software programs
g.	.MNU	Menu file (common to AutoCAD)
h.	.HLP	Help file
i.	.FNT	Font file

Types of Files
Unit 6

Assignment Sheet 1—Correct File Type Extensions

Name ______________________________ Overall Rating __________

Evaluation criterion	Rating
Extension properly corrected	______

Directions: The following extensions are incorrect. Write the part name and the correct file type extension in the correction blank.

1. AutoCAD data file: FRAME45.DWK

   Correction: ______________________

2. CADKEY data file: Part8994.PPT

   Correction: ______________________

3. DOS batch command: Autoexec.bah

   Correction: ______________________

4. DOS system command: ANSI.ssy

   Correction: ______________________

5. AutoCAD AutoLisp program file: CLINE.ASP

   Correction: ______________________

6. FastCAD micro definition file: Windel.MCC

   Correction: ______________________

7. Driver files for printer: HP550C.DRI

   Correction: ______________________

8. DesignCAD screen Image file: Picture.PIX

   Correction: ______________________

Assignment Sheet 1

9. MicroStation drawing data file: ROBOT44.DGS

Correction:________________________

10. Drawing interchange file: 985777B4.DIF

Correction:________________________

11. Executable file: ACAD.EXX

Correction:________________________

12. Text file: README.DOT

Correction:________________________

13. Command file: Command.CON

Correction:________________________

14. Initial Graphics Exchange Specification file: PARTX45.IGE

Correction:________________________

15. FastCAD drawing data file: BLOCK49.FCA

Correction:________________________

Setup
Unit 7

Objective Sheet

Unit Objective

After completing this unit, the student should be able to compile the information needed to create a default drawing. The student should demonstrate this competency by completing the assignment sheet and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to setup with their correct definitions.
2. Select true statements about guidelines for creating a default drawing.
3. Arrange in order the steps in creating a default drawing.
4. Compile information needed to create a default drawing. (Assignment Sheet 1)

Setup
Unit 7

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction or individual learning activities. Study the specific objectives to determine the order in which you will present the objectives.

2. Review Teaching Suggestions section that follows. Plan for classroom activities.

3. Plan presentation for enrichment of exceptional students as well as accommodation of special needs students.

4. Make transparencies from transparency masters included with this unit. These appear in the teacher guide only and are designed to be used with the following objectives:

   TM 1—Grid and Snap (Objective 2)
   TM 2—Layers (Objective 2)
   TM 3—Line Types, Colors, and Line Widths (Objective 2)
   TM 4—Limits (Objective 2)
   TM 5—Units and Type of Drawing (Objective 2)
   TM 6—System Variables and Text (Objective 2)
   TM 7—Dimension Variables (Objective 2)

5. Make copies of any handouts that you plan to distribute to students.

6. Review instructions for evaluating student performance, and make copies of the Unit Evaluation Form.

Delivery and Application

7. Provide students with unit of instruction.

8. Discuss unit and specific objectives.

9. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit.

10. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Suggested Activities

Evaluation

11. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

12. Make copies of the written test. Add or modify test items as needed.

13. Give written test.

14. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments.

15. Reteach and retest as required.

Teaching Suggestions

1. Introduce the unit by discussing the importance of CAD Setup in communicating with the hardware. Skill area: **Communication Skills, Listening**.

2. Explain how companies establish standards and customization for all CAD systems to enable them to produce similar type drawings. Skill area: **Learning Skills, Learning to learn**.

3. Explain how CAD is used in electronic, mechanical, architectural, engineering, construction, process and industrial engineering, technical publications, scientific publications, fashion design, interior design and educational applications. All could use the same hardware and to some degree the same software. Skill area: **Personal Management Skills, Motivational goal setting**.

4. Explain the advantage of CAD constructed drawings over manually constructed drawings by pointing out that CAD:

    a. Increases productivity

    b. Develops a more professional image

    c. Produces higher quality drawings

    d. Produces more accurate drawings

    e. Opens up a high-tech future

    f. Allows you to advance into 3D thinking.

    Skill areas for 4a-4f: **Communication skills, listening**.

Suggested Activities

5. Use Transparency 1 to discuss Grid and Snap.

6. Use Transparency 2 to discuss Layers.

7. Use Transparency 3 to discuss Line Types, Colors, and Line Widths.

8. Use Transparency 4 to discuss Limits.

9. Use Transparency 5 to discuss Units and Type of Drawing.

10. Use Transparency 6 to discuss System Variables and Text.

11. Use Transparency 7 to discuss Dimension Variables.

Skill Area for 5 through 11: **Communication Skills, listening**.

Resources Used in Developing This Unit

1. Bertoline, Gary R. *Fundamentals of CAD*, 2nd ed. Albany, NY: Delmar Publishing Inc, 1988.

2. Goetsch, David L. *Microcadd Computer-Aided Design and Drafting on Microcomputers*. Englewood Cliff, NJ: Prentice Hall, 1988.

3. Giesecke, Frederick E., et. al. *Technical Drawing*, 9th ed. New York, NY: Macmillan Publishing Company, 1991.

4. Rice, H. and D. Raker. *The Microcomputer CAD Manual*. Thousand Oaks, CA: New Riders Publishing, 1987.

Suggested Supplemental Resources

1. Conforti, Frank. *Inside MicroStation*, 2nd ed. Chamisal, NM: On Word Press, 1991.

2. *DesignCAD 3-D Reference*. Pryor, OK: American Small Business Computers, Inc., no date.

3. *FastCAD User's Guide*. Tempe, AZ: Evolution Computing, no date.

4. Fuller, James E. *Using AutoCAD*, 4th ed. Albany, NY: Delmar Publishers Inc., 1991.

5. *CADKEY Reference Manual*, Ver. 5. Vernon, CT: CADKEY Inc., 1992.

Setup
Unit 7

Answers to Assignment Sheets

Assignment Sheet 1—Answers will vary with software and instructors requirements for software and hardware, but answers should reflect proper elements from the following examples.

1. What type of drawing are you going to create?

   Example: Architectural, Mechanical, Civil, Elevation, Detail

2. What scale are you going to use for the final print?

   Example: 1″=1′, ½″=1′, ¼″=1′, 10mm=1 Meter

3. What will be the final print size?

   Example:
   A size = 8½ x 11
   B size = 11 x 17
   C size = 17 x 22
   D size = 22 x 34

4. What units will be used?

   Example: decimal, architectural, metric

5. What are the limits of the drawing area?

   Example: C size paper has a ½″ border and actual drawing area of 10″ x 15″. If the scale is 1″=1′ then set the limits to 15′ x 10′. In CAD we always draw in full scale and plot to fit paper size.

6. What grid spacing and snap spacing do you want?

   Example: Grid and snap are usually set the same, but they can be different. Set Grid and Snap based upon the scale and limits of the drawing. The grid will not show if it is too small. If the limits are 15′ x 10′ the grid may be set to one foot and snap at ½ foot.

7. What layers or levels are needed?

   Example: Layers or levels may be set based upon colors, numbers, names, line types, or standards set by the company. Layer 1-5 may be for object lines, layer 10 for dimension lines, layer 20 for notes.

Answers to Assignment Sheets

8. What system variables need to be set?

   Example: Set the line scale, text style

9. What dimension variables need to be set?

   Example: Arrowhead style, tolerance type

Setup
Unit 7

Answers to Written Test

1. a. 4
   b. 7
   c. 8
   d. 3
   e. 10
   f. 9
   g. 6
   h. 5
   i. 1
   j. 2

2. a, b, e, f, h

3. a. 3
   b. 1
   c. 4
   d. 2

Setup
Unit 7

Written Test

Name ______________________________ Date __________ Score __________

1. Match the terms on the right with their correct definitions.

______a. Standard ANSI lines used in design and drafting

______b. Standard units of measure

______c. Variables in the CAD system changeable to the needs of the operator

______d. A series of transparent overlays or levels similar to sheets of tracing paper stacked on top of each other

______e. A prototype or setup drawing which may include customizing: units, grid, snap, line type, line width, limits, system variables, and dimension variables

______f. Variables related to dimensioning in the CAD System which can be customized to the need of the operator

______g. The size of the drawing area

______h. Standard line widths

______i. A series of small visible dots arranged in rows on the screen to represent the intersection points of lines

______j. A series of small invisible points arranged in a row on the screen in which the crosshairs snap to the invisible points

1. Grid
2. Snap
3. Layers
4. Line Types
5. Line Widths
6. Limits
7. Units
8. System Variables
9. Dimension Variables
10. Default Drawing

Written Test

2. Select true statements about guidelines for creating a default drawing. Place an "X" beside each true statement.

______a. Determine what the limits of the drawing area are.

______b. Determine what system variables need to be set.

______c. Determine what dimensions need to be placed on the drawing.

______d. Determine what standard notes need to be placed on the drawing.

______e. Determine what layers or levels are needed.

______f. Determine what units will be used.

______g. Determine what method will be used to produce holes.

______h. Determine what dimension variables need to be set.

3. Arrange in order the steps in creating a default drawing. Place a 1 beside the first step and continue through the fourth step.

______a. Save on hard disk and make copies to floppy disk for safe backup.

______b. Name the startup default drawing file and go into the CAD system.

______c. Change configuration of system to recognize the new startup default drawing.

______d. Make setup default drawing changes based on answers to questions.

***Permission to duplicate this test is granted.**

Setup
Unit 7

Unit Evaluation Form

Student Name ______________________________ Unit Rating ________

Assignment Sheet 1—Compile Information Needed to Create a Default Drawing Rating _____

Comments: ____

____

Written Test Scores

Pretest _____ Posttest _____ Other _____

Other ____

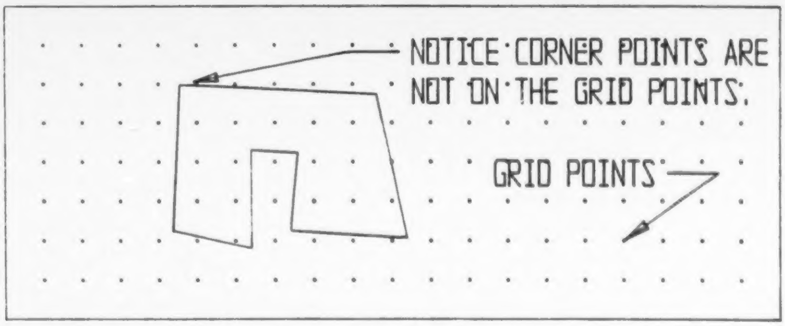
____

Teacher Signature ______________________________ Date ________

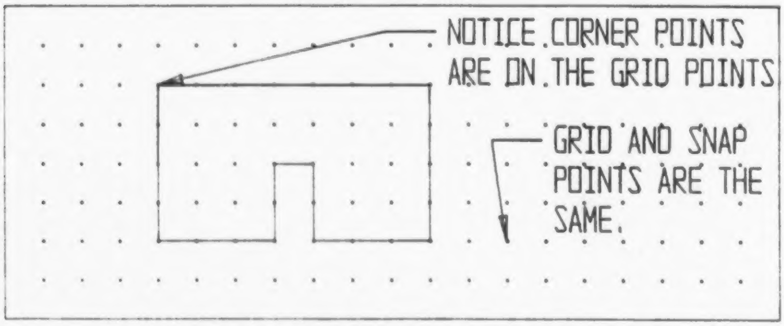
Student Signature ______________________________ Date ________

***Permission to duplicate this form is granted.**

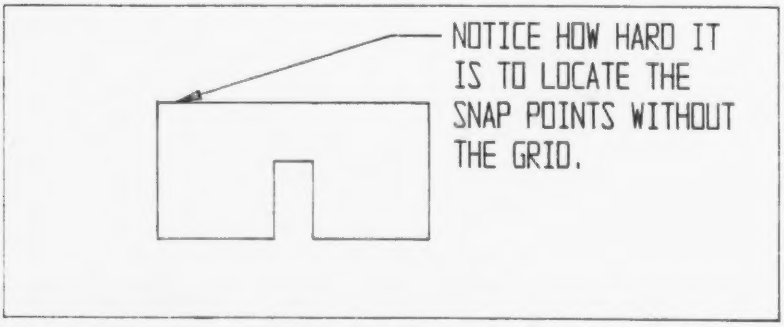
Grids and Snap


NOTICE CORNER POINTS ARE NOT ON THE GRID POINTS.
GRID POINTS

GRID WITH SNAP TURNED OFF


NOTICE CORNER POINTS ARE ON THE GRID POINTS
GRID AND SNAP POINTS ARE THE SAME.

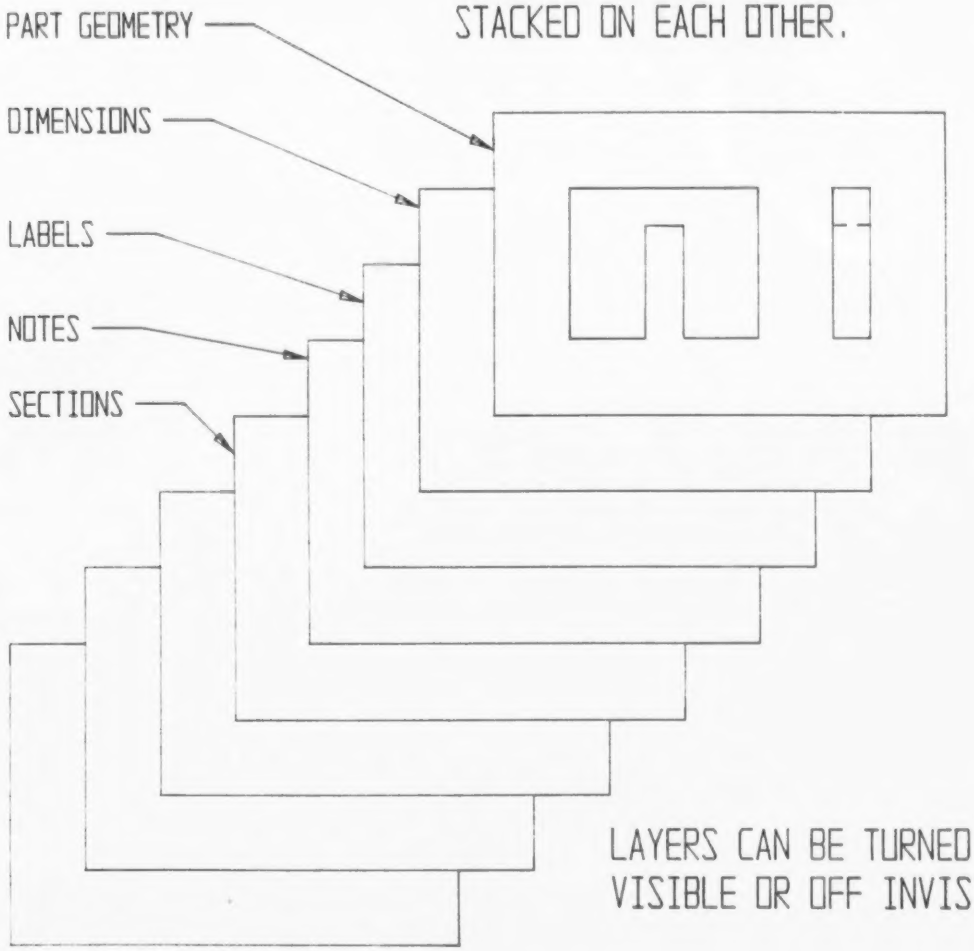
GRID WITH SNAP TURNED ON


NOTICE HOW HARD IT IS TO LOCATE THE SNAP POINTS WITHOUT THE GRID.

SNAP TURNED ON GRID TURNED OFF

Layers

LAYERS OR LEVELS OR OVERLAYS CAN BE THOUGHT OF AS SEPERATE SHEETS OF TRACING PAPER STACKED ON EACH OTHER.

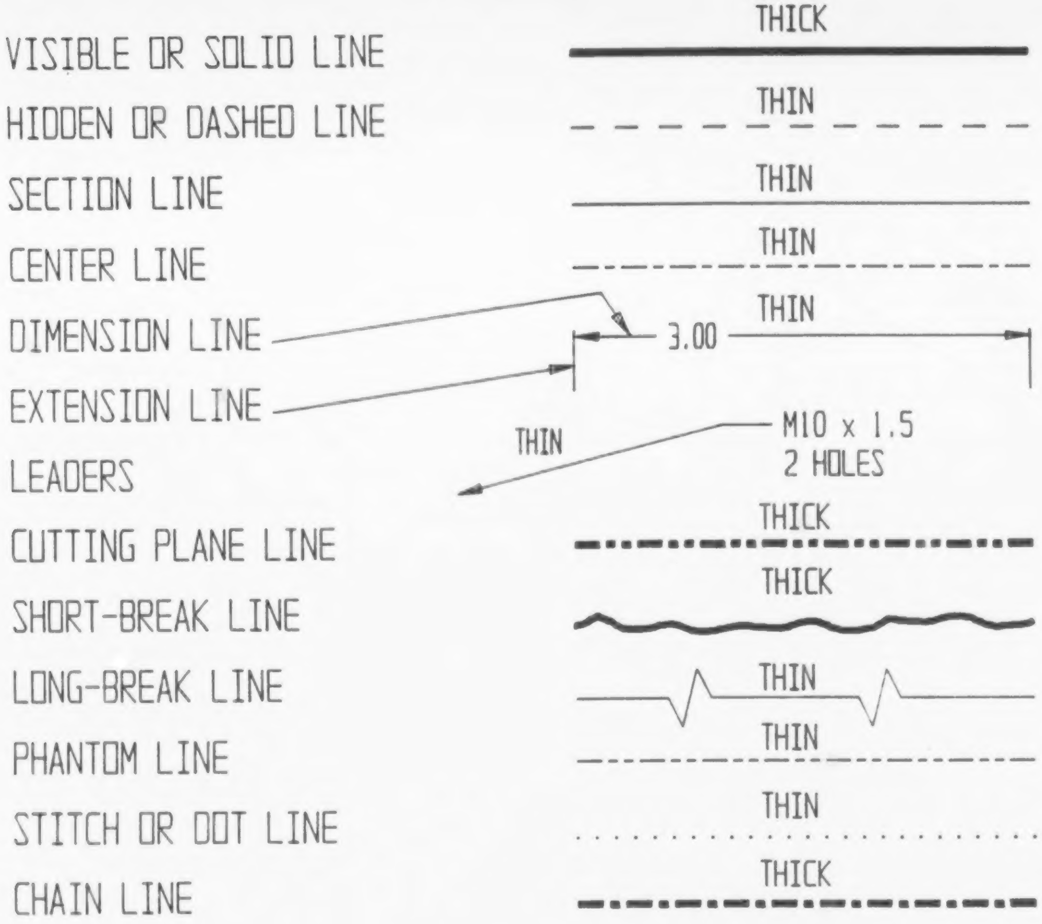

PART GEOMETRY
DIMENSIONS
LABELS
NOTES
SECTIONS

LAYERS CAN BE TURNED ON VISIBLE OR OFF INVISIBLE

A CAD SYSTEM MAY HAVE 10 TO 256 LAYERS AVAILABLE TO THE USER.

Line Types, Colors, and Line Widths

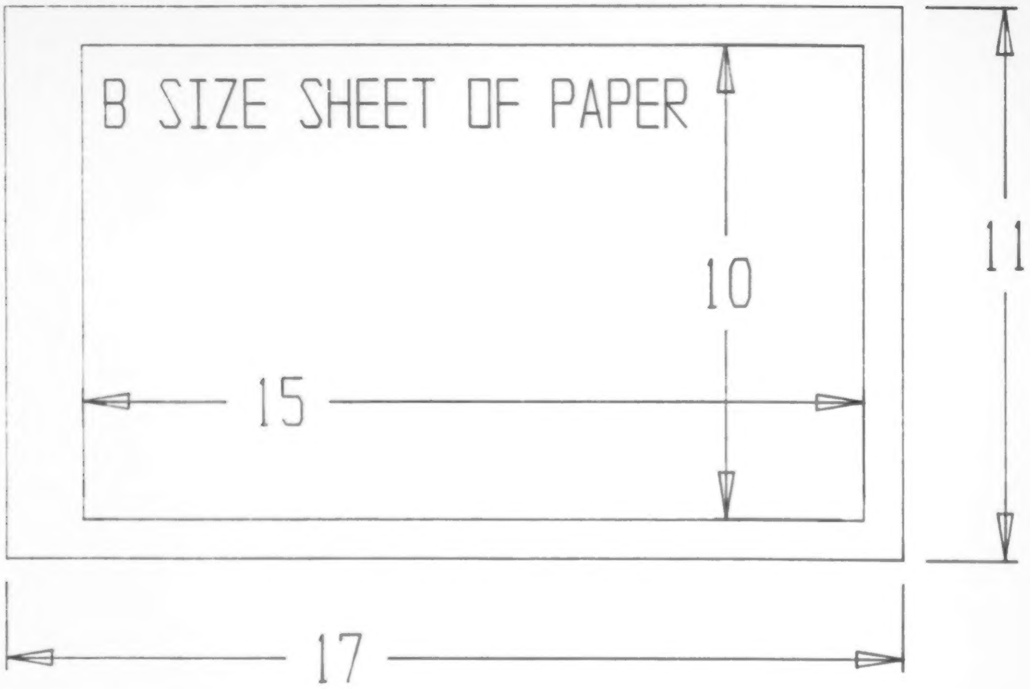
LINE TYPES


VISIBLE OR SOLID LINE
THICK
HIDDEN OR DASHED LINE
THIN
SECTION LINE
THIN
CENTER LINE
THIN
DIMENSION LINE
THIN
3.00
EXTENSION LINE
LEADERS
THIN
M10 x 1.5
2 HOLES
CUTTING PLANE LINE
THICK
SHORT-BREAK LINE
THICK
LONG-BREAK LINE
THIN
PHANTOM LINE
THIN
STITCH OR DOT LINE
THIN
CHAIN LINE
THICK

LINE WIDTHS: THICK = .70 mm or .028"
THIN = .35 mm OR .014"

COLORS:
0-BLACK
1-GREEN
2-RED
3-AMBER
4-YELLOW
5-CYAN
6-MAGENTA
7-GRAY
8-BLUE
9-LIGHT BLUE
10-LIGHT GREEN
11-LIGHT CYAN
12-LIGHT RED
13-LIGHT MAGENTA
14-WHITE
15-HIGH WHITE

Limits



HOW PAPER SIZE AND SCALE DETERMINE LIMITS

EXAMPLE 1

B SIZE PAPER IS 17″ x 11″
THE WORKING AREA IS 15″ x 10″
IF THE SCALE IS 1″ = 1′ THEN
SET THE LIMITS TO 15′ x 10′
(15″ x 1′ = 15′) (10″ x 1′ = 10′)

EXAMPLE 2

B SIZE PAPER IS 17″ x 11″
THE WORKING AREA IS 15″ x 10″
IF THE SCALE IS ¼″ = 1′ OR 1″ = 4′ THEN
SET THE LIMITS TO 60′ x 40′
(15″ x 4′ = 60′) (10″ x 4′ = 40′)

NOTE: CAD DRAWINGS ARE ALWAYS DRAWN
IN FULL SCALE. WE ALWAYS PLOT TO SCALE.

Units and Type of Drawing

UNITS:	TYPE OF DRAWING
INCHES	DECIMAL 15.75 FRACTIONAL 15 3/4 SCIENTIFIC 1.575E+01
FEET	ARCHITECTURAL 1′ - 3 3/4″ ENGINEERING 1′ - 3.75″
YARDS	DECIMAL 1.5 YD FRACTIONAL 4 1/2 YD
MILLIMETERS	DECIMAL 4.56 MM
CENTIMETERS	DECIMAL 20.67 CM
METERS	DECIMAL 368.4 M

System Variables and Text

1. GRID AND SNAP SIZE
2. LINE TYPE
3. LINE WIDTH
4. PEN NUMBER
5. NOTE TEXT HEIGHT
6. NOTE TEXT FONT STYLE
7. TEXT ASPECT RATIO
8. TEXT ROTATION ANGLE
9. VIEW
10. ACTIVE LAYER OR LEVEL
11. COLOR
12. COORDINATE SYSTEM

TEXT FONTS OR STYLES

ABCDEFGHIJKLMNO	ABCDEFGHIJKLMNO
PQRSTUVWXYZ	PQRSTUVWXYZ
abcdefghijklmno	abcdefghijklmno
pqrstuvwxyz	pqrstuvwxyz
1234567890	1234567890
!@#$%~&*()	!@#$%~&*()

Dimension Variables

1. ARROW HEAD STYLE
2. ARROW HEAD SIZE
3. DIMENSION TEXT FONT OR STYLE
4. DIMENSION TEXT SIZE
5. DIMENSIONS ABOVE OR INLINE
6. TOLERANCES USING LIMITS OR + AND -
7. DIMENSION COLOR
8. NUMBER OF PLACES TO THE RIGHT
9. EXTENSION LINE SUPPRESSION
10. DIMENSION SCALE

Setup
Unit 7

Information Sheet

1. **Terms and definitions**

   a. **Default Drawing** — A prototype or setup drawing which may include customizing: units, grid, snap, line type, line width, limits, system variables, and dimension variables

   b. **Dimension Variables** — Variables related to dimensioning in the CAD System which can be customized to the need of the operator

   Example: Tolerances, arrowhead style, dimension text height

   c. **Grid** — A series of small visible dots arranged in rows on the screen to represent the intersection points of lines

   d. **Layers** — A series of transparent overlays or levels similar to sheets of tracing paper stacked on top of each other

   e. **Limits** — The size of the drawing area

   Example: "A" size paper 8.5 x 11 may have limits of 7.5 x 10. "B" size paper 11 x 17 may have limits of 10 x 17.

   f. **Line Types** — Standard ANSI lines used in design and drafting

   Example: Solid line, phantom line, center line, hidden line

   g. **Line Widths** — Standard line widths

   Example: A thick line = .7 mm or .032″ and a thin line = .35 mm or .016″.

   h. **Snap** — A series of small invisible points arranged in a row on the screen in which the crosshairs snap to the invisible points

   Note: When the grid is visible, the snap may snap to the grid points. When the grid is off, the snap will continue to snap to the invisible grid.

   i. **System Variables** — Variables in the CAD system changeable to the needs of the operator

   Example: 1) Number of places to right of the decimal. 2) The height of the text. 3) The style of text font.

   j. **Units** — Standard units of measure

   Example: Inches, millimeters, feet, yards, and meters

Information Sheet

2. **Guidelines for creating a default drawing**

   a. Determine what type of drawing you are going to create.

      Example: Architectural, Mechanical, Civil, Elevation, Detail

   b. Determine what scale you are going to use for the final print.

      Example: 1″=1′, ½″=1′, ¼″=1″, 10mm=1 Meter

   c. Determine what the final print size will be.

      Example:
      A size = 8½ x 11
      B size = 11 x 17
      C size = 17 x 22
      D size = 22 x 34

   d. Determine what units will be used.

      Example: decimal, architectural, metric

   e. Determine what the limits of the drawing area are.

      Example: C size paper has a ½″ border and actual drawing area of 10″ x 15″. If the scale is 1″=1′ then set the limits to 15′ x 10′. In CAD we always draw in full scale and plot to fit paper size.

   f. Determine what grid spacing and snap spacing you want.

      Example: Grid and snap are usually set the same, but they can be different. Set Grid and Snap based upon the scale and limits of the drawing. The grid will not show if it is too small. If the limits are 15′ x 10′, the grid may be set to one foot and snap at ½ foot.

   g. Determine what layers or levels are needed.

      Example: Layers or levels may be set based upon colors, numbers, names, line types, or standards set by the company. Layer 1-5 may be for object lines, layer 10 for dimension lines, layer 20 for notes.

   h. Determine what system variables need to be set.

      Example: Set the line scale, text style.

   i. Determine what dimension variables need to be set.

      Example: Set the arrowhead style, tolerance type.

Information Sheet

3. Steps in creating a default drawing

a. Name the startup default drawing file and go into the CAD system.

Example: Call it Setup, Protol, Blank, Default, ACAD, Archstrt, Mechstrt, or other descriptive title.

b. Make setup default drawing changes based on answers to questions.

Example: Layers, grid, snap, system variables

c. Save on hard disk and make copies to floppy disk for safe backup.

d. Change configuration of system to recognize the new startup default drawing.

Setup
Unit 7

Assignment Sheet 1—Compile Information Needed to Create a Default Drawing

Name ______________________ Overall Rating ________

Evaluation criteria	**Rating**
All questions answered in a neat manner	______
All questions have correct information	______

Directions: Visit with your instructor and ask questions about the creation of a default drawing for the system and software you will be using. **Print** your answers in the space provided.

1. What type of drawing are you going to create?

   ____

2. What scale are you going to use for the final print?

   ____

3. What will be the final print size?

   ____

4. What units will be used?

   ____

5. What are the limits of the drawing area?

   ____

6. What grid spacing and snap spacing do you want?

   ____

7. What layers or levels are needed?

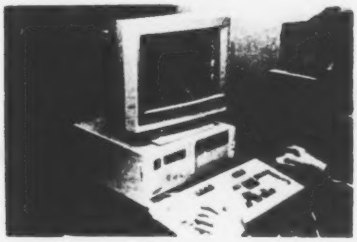
   ____

8. What system variables need to be set?

   ____

9. What dimension variables need to be set?

   ____



Basic Geometric Construction
Unit 8

Objective Sheet

Unit Objective

After completing this unit, the student should be able to sketch and dimension multiviews of a part, use drawing instruments to construct geometric constructions, sketch entities, and figure absolute and relative and polar coordinates. The student should demonstrate these competencies by completing the assignment sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to basic geometric construction with their correct definitions.
2. Complete statements about entities and their applications in geometric construction.
3. Select true statements about editing entities and their uses in geometric construction.
4. Apply techniques for inputting coordinates.
5. Identify geometric construction techniques.
6. Sketch and dimension principal views of a part. (Assignment Sheet 1)
7. Draw with drawing instruments the geometric construction of a rocker arm. (Assignment Sheet 2)
8. Draw with drawing instruments the geometric construction of a shift lever. (Assignment Sheet 3)
9. Sketch selected entities. (Assignment Sheet 4)
10. Sketch the editing of selected entities. (Assignment Sheet 5)
11. Figure the absolute coordinates of a V-block. (Assignment Sheet 6)
12. Figure the relative and polar coordinates of a gasket. (Assignment Sheet 7)

Basic Geometric Construction
Unit 8

Suggested Activities

Instructional Plan

Preparation

1. Read the unit carefully and plan for instruction or individual learning activities. Study the specific objectives to determine the order in which you will present the objectives.
2. Review Teaching Suggestions section that follows. Plan for classroom activities.
3. Plan presentation for enrichment of exceptional students as well as accommodation of special needs students.
4. Make transparencies from the transparency masters included with this unit. These appear in the teacher edition only and are designed to be used with the following objectives:

   TM 1—Types of Entities (Objective 2)
   TM 2—Editing Entities (Objective 3)
   TM 3—Cartesian Coordinate System (Objective 4)
   TM 4—Absolute Coordinates (Objective 4)
   TM 5—Relative Coordinates (Objective 4)
   TM 6—Polar Coordinates (Objective 4)
   TM 7—Reading Angles (Objective 4)
   TM 8—Geometric Construction Techniques (Objective 5)

5. Make copies of any handouts that you plan to distribute to students.
6. Review instructions for evaluating student performance, and make copies of the Unit Evaluation Form.

Delivery and Application

7. Provide students with unit of instruction.
8. Discuss unit and specific objectives.
9. Discuss information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
10. Discuss the assignment sheets. Review criteria for evaluation of these activities.

Suggested Activities

Evaluation

11. Discuss the use of the Unit Evaluation Form with students. Discuss the rating scale that will be used for student evaluation.

12. Make copies of the written test. Add or modify test items as needed.

13. Give written test.

14. Compile assignment sheet ratings and written test scores on the Unit Evaluation Form. Include any additional assignments.

15. Reteach and retest as required.

Teaching Suggestions

Note: Skill areas appearing in boldface type in the Teaching Suggestions refer to the academic and workplace skills identified by the American Society for Training and Development (ASTD) and the U.S. Department of Labor. These have been adapted by MAVCC.

1. Introduce the unit by discussing the importance of learning basic geometric construction before using a CAD system. Anyone can learn to move a mouse around and draw a few lines and circles on a CAD system. The CAD operator with a background in the fundamentals of geometry and drafting will be able to learn CAD with ease. Skill areas: **Learning skills, learning to learn**.

2. Recommend the students take the Basic Drafting course before taking CAD. Have the students practice sketching multiviews and dimensioning. Students can make just as many mistakes on CAD as they can on a manual drawing board if they do not remember the ANSI Drafting Standards. Skill areas: **Personal management skills, motivation/goal setting**.

3. Even if a student has had a basic drafting course, have the student perform the geometric construction assignments. The review will help the student do better on a CAD system. Skill areas: **Foundation skills, science**.

4. Use Transparency 1 to discuss Types of Entities.

5. Use Transparency 2 to discuss Editing Entities.

6. Use Transparency 3 to discuss Cartesian Coordinate System.

7. Use Transparency 4 to discuss Absolute Coordinates.

Suggested Activities

8. Use Transparency 5 to discuss Relative Coordinates.

9. Use Transparency 6 to discuss Polar Coordinates.

10. Use Transparency 7 to discuss Reading Angles.

11. Use Transparency 8 to discuss Geometric Construction Techniques.

Skill areas for 4 through 11: **Communication skills, listening**.

Resources Used in Developing This Unit

1. Goetsch, David L. *Microcadd Computer-Aided Design and Drafting on Microcomputers.* Englewood Cliff, NJ: Prentice Hall, 1988.
2. Giesecke, Frederick E., et. al. *Technical Drawing*, 9th Ed. New York: Macmillan Publishing Company, 1991.
3. Conforti, Frank. *Inside MicroStation*, 2nd Ed. Chamisal, NM: On Word Press, 1991.
4. *DesignCAD 3-D Reference.* Pryor, OK: American Small Business Computers, Inc., nd.
5. *FastCAD User's Guide.* Tempe, AZ: Evolution Computing, nd.
6. Fuller, James E. *Using AutoCAD*, 4th Ed. Albany, NY: Delmar Publishers, Inc., 1991.
7. *CADKEY Reference Manual*, Ver. 5. Vernon, CT: CADKEY, Inc., 1992.

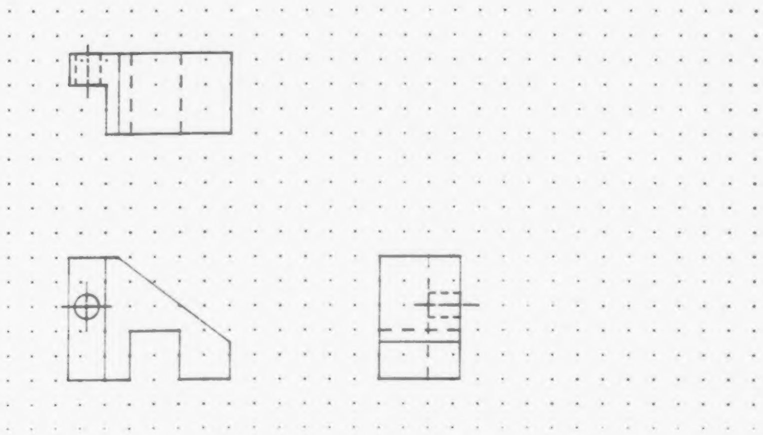
Suggested Supplemental Resources

1. *Basic Drafting.* Stillwater, OK: Mid-America Vocational Curriculum Consortium, 1989.
2. McClain, Gerald R. *Mechanical Drafting.* Stillwater, OK: Mid-America Vocational Curriculum Consortium, 1982.

Basic Geometric Construction
Unit 8

Answers to Assignment Sheets

Assignment Sheet 1



Assignment Sheet 2—Student drawing should be evaluated by the instructor in accordance with evaluation criteria.

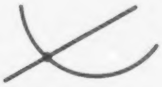
Assignment Sheet 3—Student drawing should be evaluated by instructor in accordance with evaluation criteria.

Assignment Sheet 4—Student drawings should be evaluated by instructor in accordance with evaluation criteria.

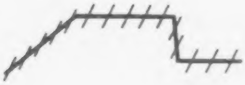
Answers to Assignment Sheets

Assignment Sheet 5

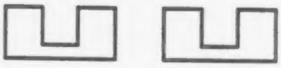
1.



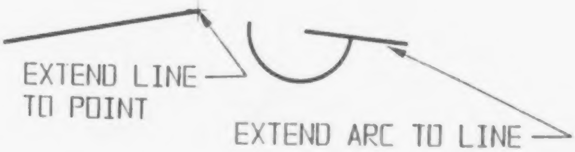
2.



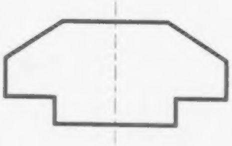
3.



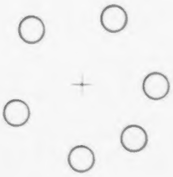
4.


EXTEND LINE TO POINT
EXTEND ARC TO LINE

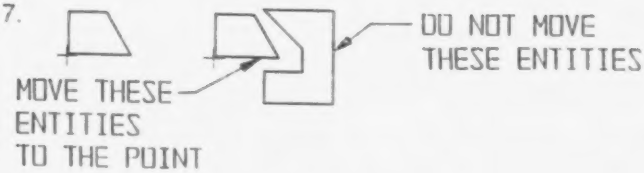
5.



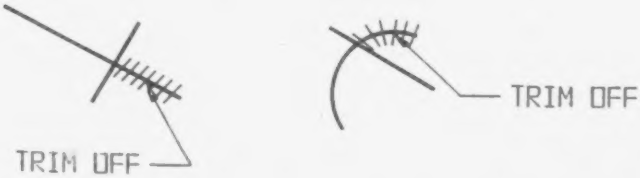
6.



7.


DO NOT MOVE THESE ENTITIES
MOVE THESE ENTITIES TO THE POINT

8.


TRIM OFF
TRIM OFF

Answers to Assignment Sheets

Assignment Sheet 6

	X	Y		X	Y
A.	5	0	I.	3	4.5
B.	5.5	0	J.	1.5	6.5
C.	5.5	1	K.	0	6.5
D.	4.5	1	L.	0	3
E.	4.5	3	M.	1.5	3
F.	6	3	N.	1.5	1
G.	6	6.5	O.	.5	1
H.	4.5	6.5			

Assignment Sheet 7

A.	0	4.5	M.	2.5⟩	216.87°
B.	3.35⟩	26.57°	N.	0	3.5
C.	4.5	0	O.	2	0
D.	0	2.5	P.	-2	0
E.	4	0	Q.	0	-3.5
F.	4.03⟩	60.26°	R.	0	3
G.	0	1.5	S.	4.5	0
H.	-4	0	T.	0	-.5
I.	0	-2.5	U.	2.55⟩	11.31°
J.	-5	0	V.	0	-2
K.	0	2.5	W.	-2	0
L.	-2.5	0			

Basic Geometric Construction
Unit 8

Answers to Written Test

1.

a.	4	d.	3	g.	8
b.	2	e.	1	h.	5
c.	6	f.	9	i.	7

2.
a. Normal
b. Inclined
c. Oblique
d. Center, radius
e. Points
f. Leaders
g. Nodes
h. Entities
i. Irregular, French
j. Oblique
k. Polygon

3. b, d, e, g, i

4. Cartesian coordinates

a. +4, +4
b. -6, +2
c. -5, -2
d. -2, -4
e. +4, -3

Absolute coordinates

a. 3, 8
b. 3, 5
c. 5, 5
d. 5,3
e. 7,1

Relative coordinates

a. 0, -4
b. 1, 0
c. 0, 2
d. -2, 2
e. 0, 3

Answers to Written Test

Polar coordinates

a. 1.5, -90
b. 1.3, -53.1
c. 1.8, 0
d. 1.1, 63.4
e. 3.4, 153.4

Reading angles

a. +104°
b. +31°
c. -146°
d. -116°
e. +135°

5. a. Segment arc
b. Perpendicular lines
c. Tangent
d. Intersection
e. Stretch
f. Parallel lines
g. Scale

Basic Geometric Construction
Unit 8

Answers to Written Test

1\.
- a. 4
- b. 2
- c. 6
- d. 3
- e. 1
- f. 9
- g. 8
- h. 5
- i. 7

2\.
- a. Normal
- b. Inclined
- c. Oblique
- d. Center, radius
- e. Points
- f. Leaders
- g. Nodes
- h. Entities
- i. Irregular, French
- j. Oblique
- k. Polygon

3. b, d, e, g, i

4. Cartesian coordinates

- a. +4, +4
- b. -6, +2
- c. -5, -2
- d. -2, -4
- e. +4, -3

Absolute coordinates

- a. 3, 8
- b. 3, 5
- c. 5, 5
- d. 5,3
- e. 7,1

Relative coordinates

- a. 0, -4
- b. 1, 0
- c. 0, 2
- d. -2, 2
- e. 0, 3

Answers to Written Test

Polar coordinates

a. 1.5, -90
b. 1.3, -53.1
c. 1.8, 0
d. 1.1, 63.4
e. 3.4, 153.4

Reading angles

a. +104°
b. +31°
c. -146°
d. -116°
e. +135°

5. a. Segment arc
   b. Perpendicular lines
   c. Tangent
   d. Intersection
   e. Stretch
   f. Parallel lines
   g. Scale

Basic Geometric Construction
Unit 8

Written Test

Name ______________________________ Date __________________ Score ____________

1. Match the terms on the right with their correct definitions.

______a. The X, Y, and Z dimensions of a point in space

______b. Changing the attributes of an entity or entities

______c. The X, Y, and Z dimensions of a point in space from another point in space or the origin

______d. Positioning of entity exactly on another entity or coordinate point

______e. Elements or primitives of line, text, circle, point, arc, and spline

______f. Changing the X, Y, and Z position of the origin with respect to the drawing

______g. The angle and distance from the origin to a point in space

______h. The X, Y, and Z dimensions of a point in space from absolute zero or the origin

______i. The color, line type, layer, and width of an entity

1. Entities
2. Editing
3. Object Snapping
4. Cartesian or Rectangular Coordinates
5. Absolute Coordinates
6. Relative Coordinates
7. Attributes
8. Polar Coordinates
9. Reset Origin

Written Test

2. Complete statements about entities and their applications in geometric construction. Circle the material that best completes each of the following statements.

   a. Lines drawn both horizontal and vertical are called (**normal**) (**oblique**) lines.

   b. Lines drawn at an angle in one direction are called (**oblique**) (**inclined**) lines

   c. Lines drawn at an angle in two directions are called (**inclined**) (**oblique**) lines.

   d. Circles are constructed by their (**center**) (**chord**) and diameter, edge or (**radius**) (**oblique**).

   e. Arcs are constructed by selecting three (**points**) (**ends**), center and diameter or radius plus the start angle and end angle.

   f. Text is used for notes, dimensions and (**leaders**) (**extensions**) with notes.

   g. Points and (**nodes**) (**crosses**) are used to indicate one x, y, and z coordinate position in space.

   h. Polyline is one entity made up of a complex set of (**entities**) (**segments**) which may taper, curve, arc, or appear as a line.

   i. Splines are (**irregular**) (**regular**) curves similar to (**French**) (**English**) curves.

   j. Ellipse is a conic (**oblique**) (**perpendicular**) section through a cone producing a minor and major axis.

   k. Regular polygon is a closed (**polygon**) (**polyline**) made up of three or more lines of equal length.

3. Select true statements about editing entities and their uses in geometric construction. Place an "X" beside each true statement.

   ______a. Trim is used to break a line or arc into two parts.

   ______b. Mirror is used to duplicate an entity or entities about a symmetrical line or mirror line.

   ______c. Move is used to copy an entity or entities at another location.

   ______d. Extend is used to make a line or arc longer.

   ______e. Change is used to change attributes of entities.

   ______f. Erase is used to delete an entity from the printer.

Written Test

______g. Break is used to break a line or arc into two or more parts.

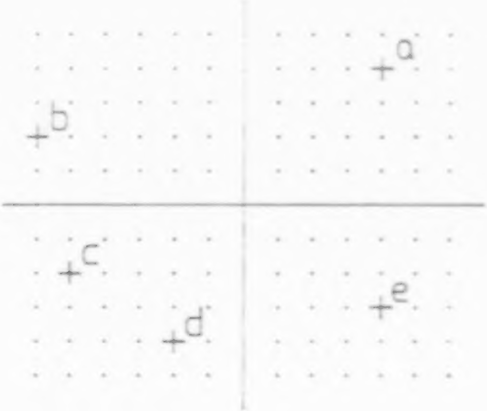
______h. Copy is used to move an entity or entities to another part of the drawing area.

______i. Rotate is used to duplicate an entity or entities about a center.

4. Apply techniques for inputting coordinates. Study the graphics with each of the following categories and apply the appropriate technique to complete the directions.

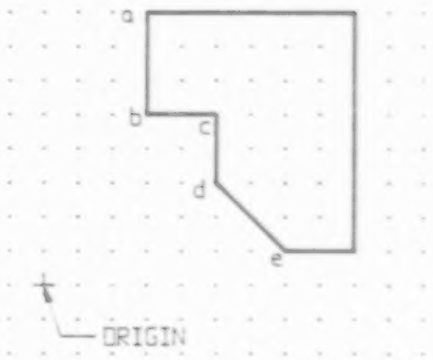
Complete a chart of Cartesian coordinates indicating whether they are positive or negative values.

a. (______, ______)
b. (______, ______)
c. (______, ______)
d. (______, ______)
e. (______, ______)



Complete a chart of absolute coordinates.

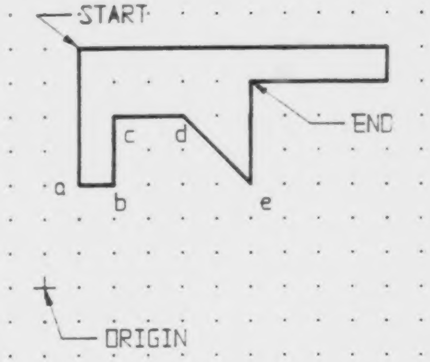
a. (______, ______)
b. (______, ______)
c. (______, ______)
d. (______, ______)
e. (______, ______)



Written Test

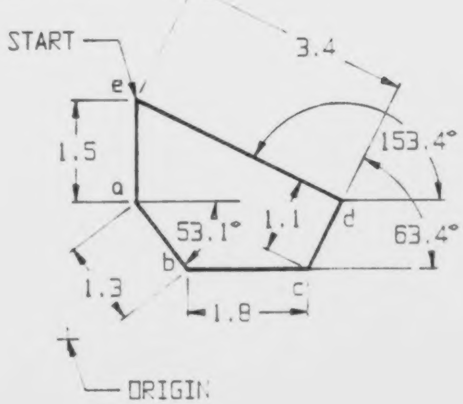
Complete a chart of relative coordinates.

a. (______, ______)
b. (______, ______)
c. (______, ______)
d. (______, ______)
e. (______, ______)


START
END
c
d
a
b
e
ORIGIN

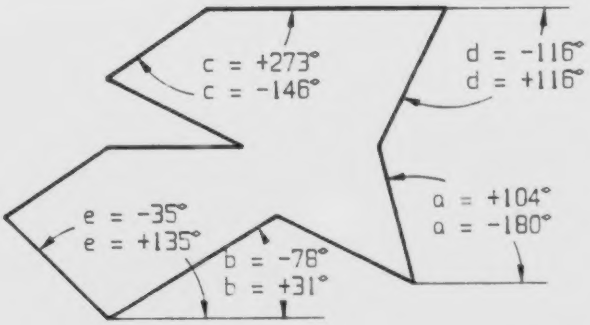
Complete a chart of polar coordinates.

a. (______, ______)
b. (______, ______)
c. (______, ______)
d. (______, ______)
e. (______, ______)


START
3.4
e
1.5
153.4°
a
53.1°
1.1
d
63.4°
b
1.3
c
1.8
ORIGIN

Complete a chart of reading angles.

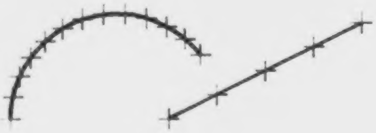
a. (______, ______)
b. (______, ______)
c. (______, ______)
d. (______, ______)
e. (______, ______)


c = +273°
c = -146°
d = -116°
d = +116°
a = +104°
a = -180°
e = -35°
e = +135°
b = -78°
b = +31°

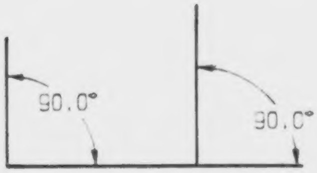
Written Test

5. Identify geometric construction techniques. Write the name of the technique in the blank beside the appropriate graphic.

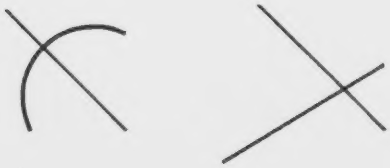
a. ____________________



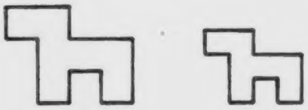
b. ____________________



c. ____________________

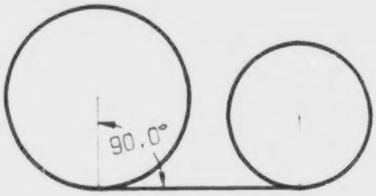


d. ____________________

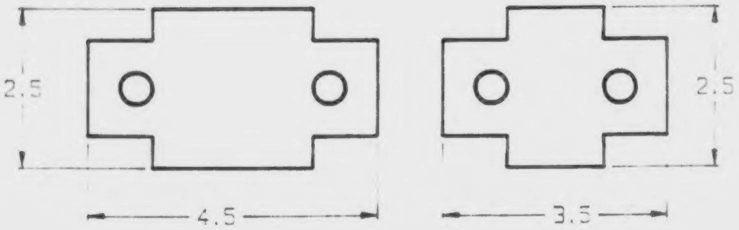


Written Test

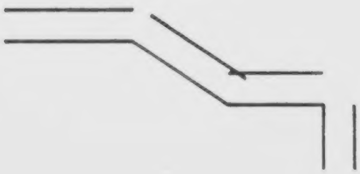
e. ______________________



f. ______________________



g. ______________________



*Permission to duplicate this test is granted.

Basic Geometric Construction
Unit 8

Unit Evaluation Form

Student Name ______________________ Unit Rating __________

Assignment Sheet 1—Sketch and Dimension Principal Views of a Part Rating ______

Comments: ______________________

Assignment Sheet 2—Draw With Drawing Instruments the Geometric Construction of a Rocker Arm Rating ______

Comments: ______________________

Assignment Sheet 3—Draw With Drawing Instruments the Geometric Construction of a Shift Lever Rating ______

Comments: ______________________

Assignment Sheet 4—Sketch Selected Entities Rating ______

Comments: ______________________

Assignment Sheet 5—Sketch the Editing of Selected Entities Rating ______

Comments: ______________________

Assignment Sheet 6—Figure the Absolute Coordinates of a V-Block Rating ______

Comments: ______________________

Assignment Sheet 7—Figure the Relative and Polar Coordinates of a Gasket Rating ______

Comments: ______________________

Unit Evaluation Form

Written Test Scores

Pretest ______ Posttest ______ Other ______

Other ____

____

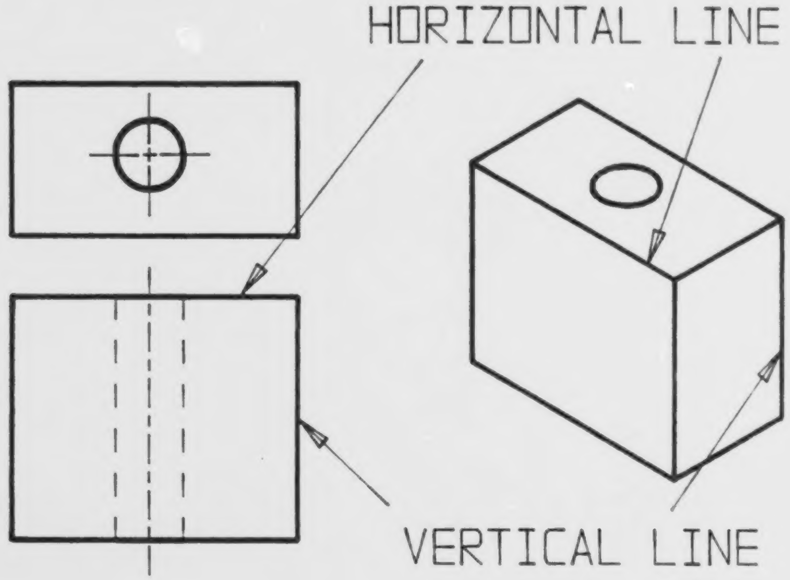
Teacher Signature ________________________________ Date ____________

Student Signature ________________________________ Date ____________

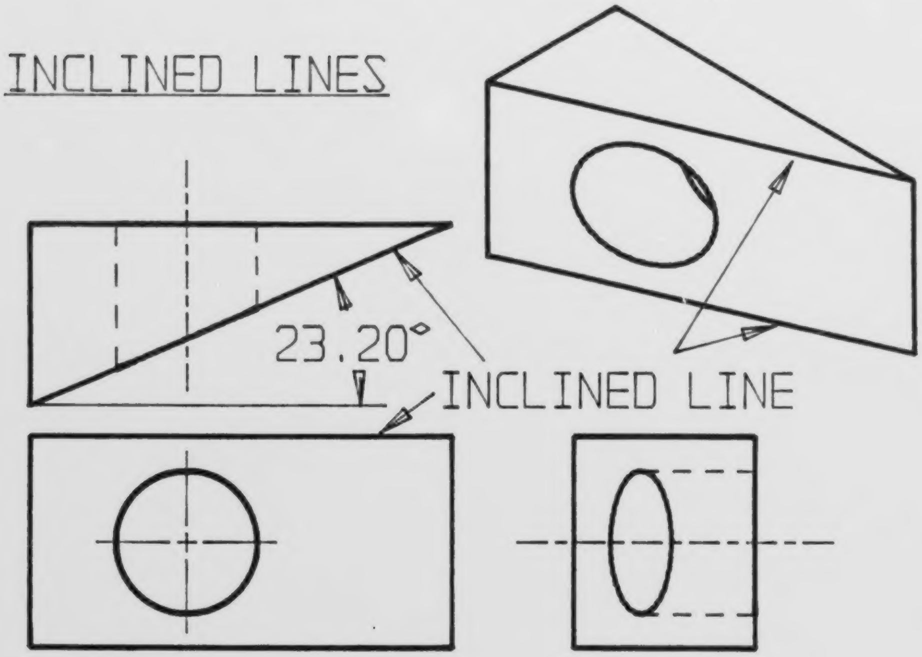
***Permission to duplicate this form is granted.**

Type of Entities

HORIZONTAL AND VERTICAL LINES

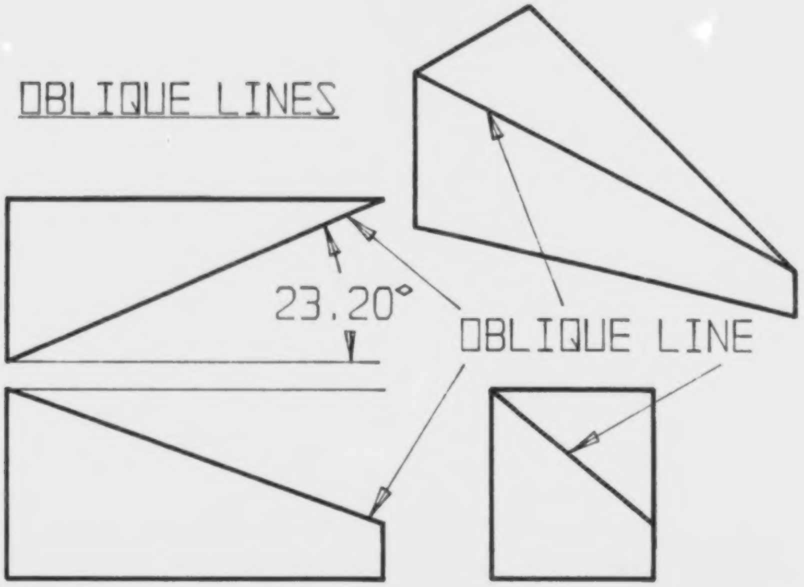

HORIZONTAL LINE
VERTICAL LINE

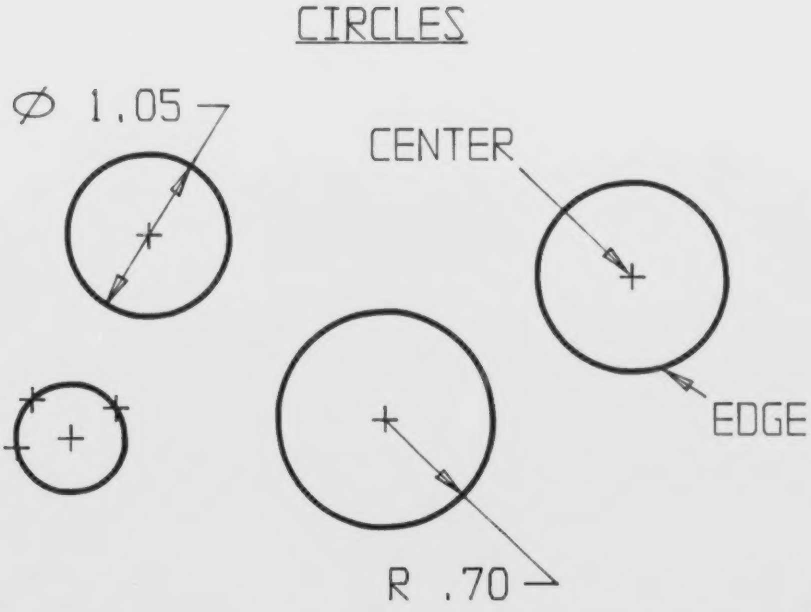
INCLINED LINES


23.20°
INCLINED LINE

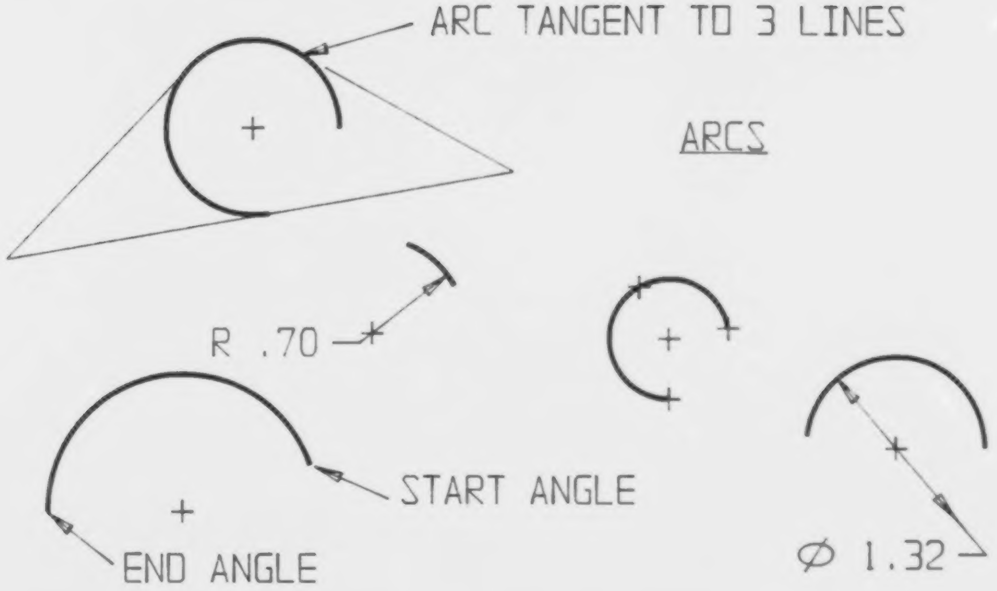
Type of Entities

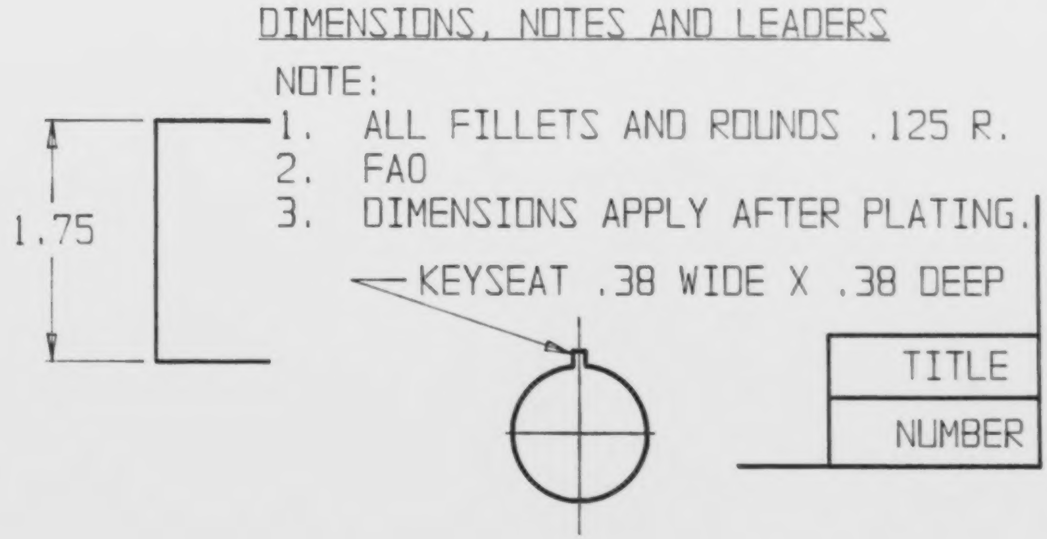
(Continued)


OBLIQUE LINES
23.20°
OBLIQUE LINE

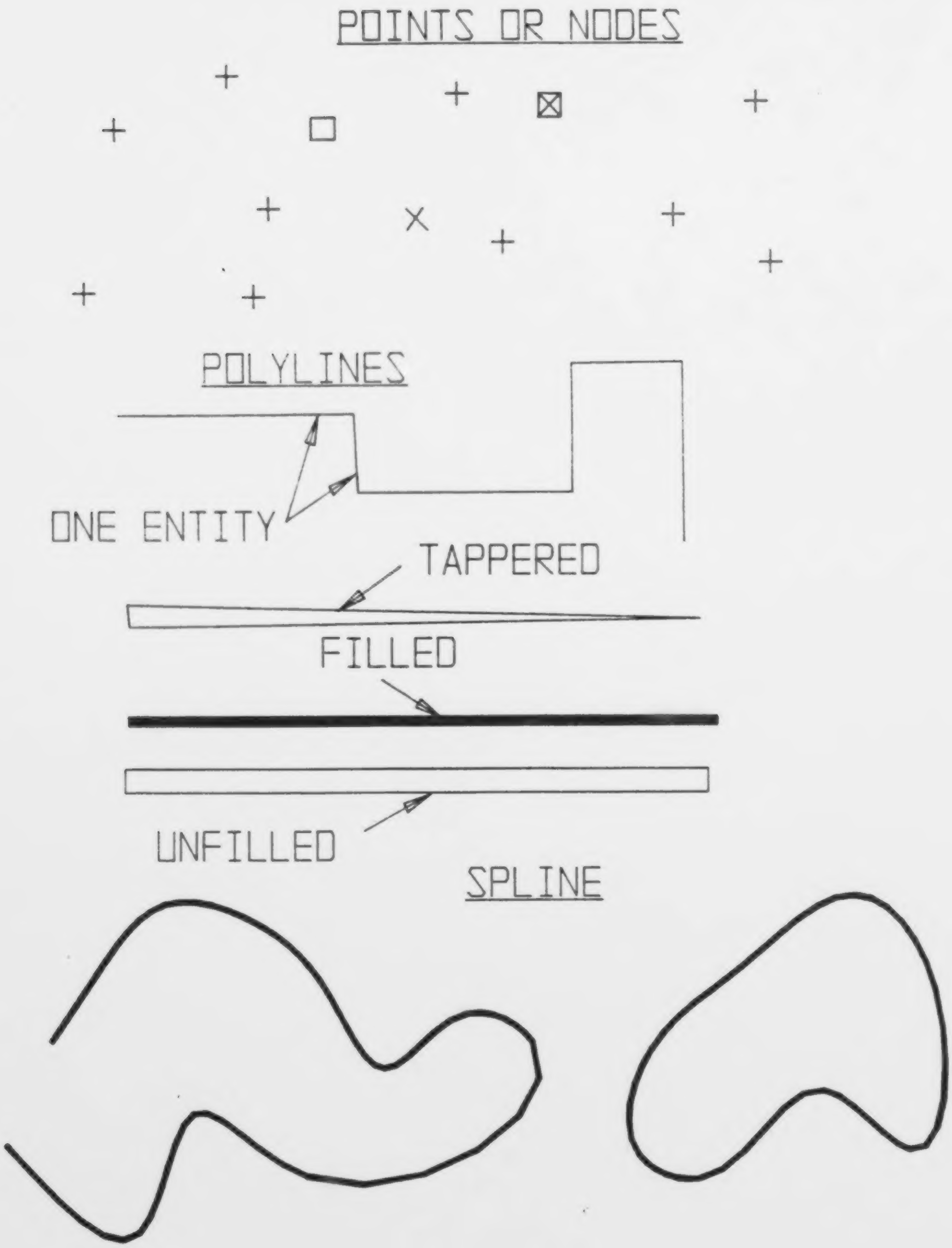

CIRCLES
Ø 1.05
CENTER
EDGE
R .70

Type of Entities
(Continued)

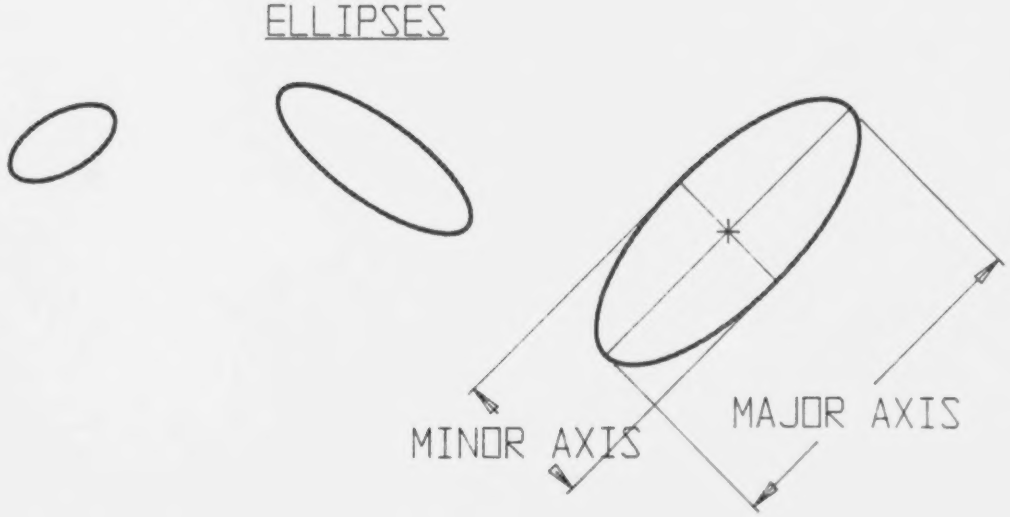

ARC TANGENT TO 3 LINES
ARCS
R .70
START ANGLE
END ANGLE
∅ 1.32

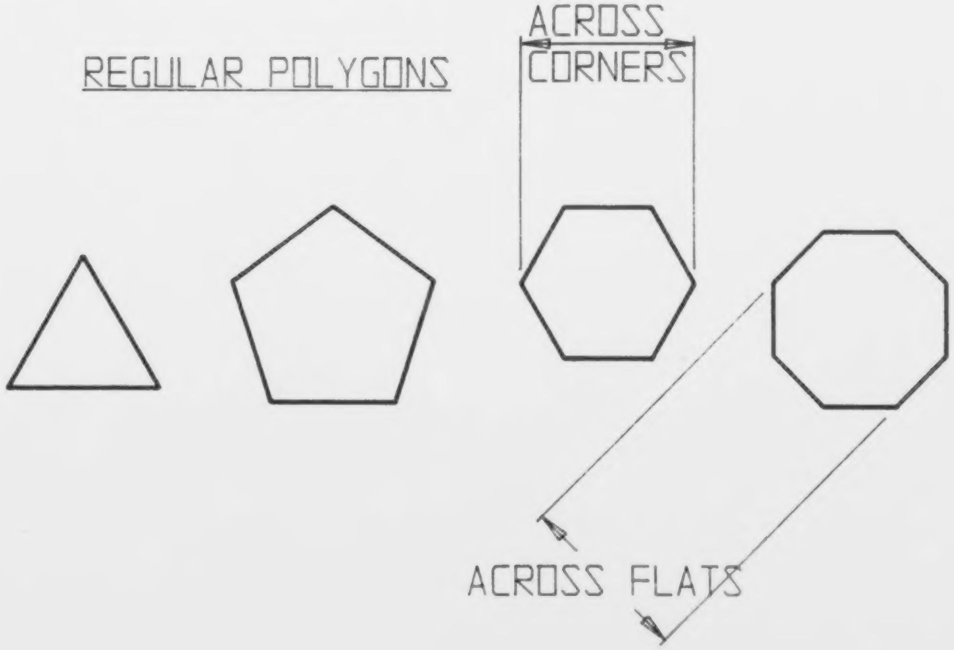

DIMENSIONS, NOTES AND LEADERS
NOTE:
1. ALL FILLETS AND ROUNDS .125 R.
2. FAO
3. DIMENSIONS APPLY AFTER PLATING.
1.75
KEYSEAT .38 WIDE X .38 DEEP
TITLE
NUMBER

Type of Entities
(Continued)

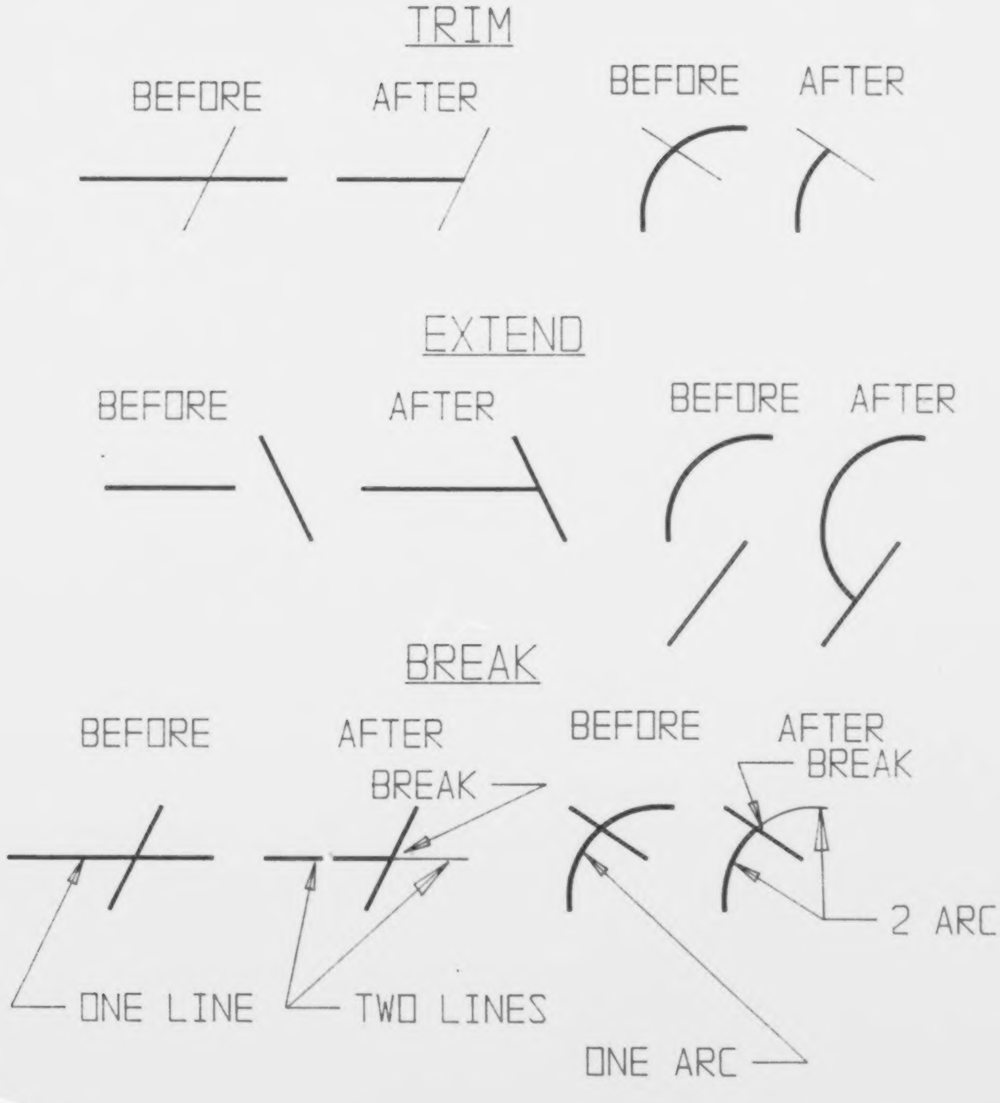

POINTS OR NODES
POLYLINES
ONE ENTITY
TAPPERED
FILLED
UNFILLED
SPLINE

Type of Entities
(Continued)

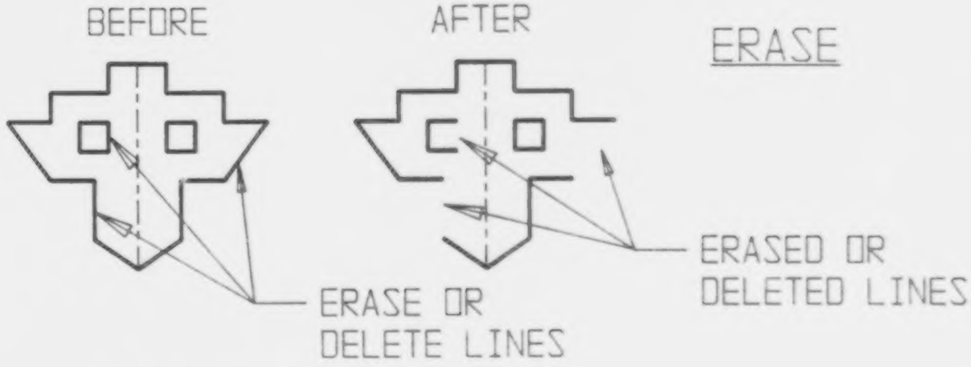

ELLIPSES
MINOR AXIS
MAJOR AXIS

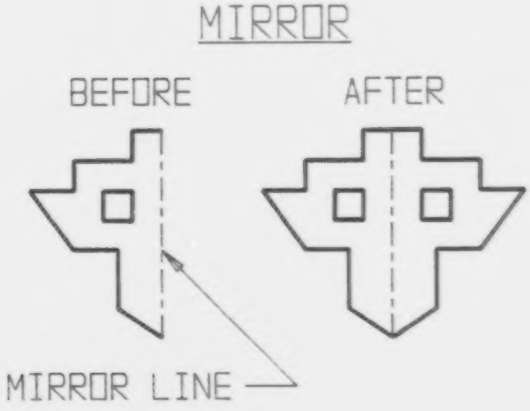

REGULAR POLYGONS
ACROSS CORNERS
ACROSS FLATS

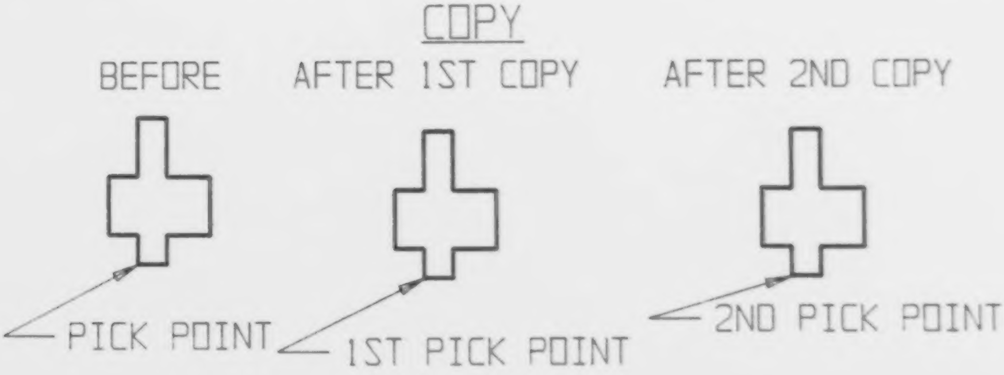
Editing Entities


TRIM
BEFORE
AFTER
BEFORE
AFTER
EXTEND
BEFORE
AFTER
BEFORE
AFTER
BREAK
BEFORE
AFTER
BREAK
BEFORE
AFTER
BREAK
2 ARC
ONE LINE
TWO LINES
ONE ARC

Editing Entities
(Continued)

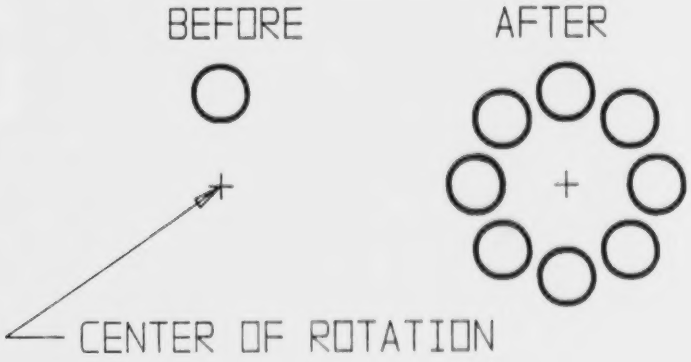

BEFORE
AFTER
ERASE
ERASE OR DELETE LINES
ERASED OR DELETED LINES


MIRROR
BEFORE
AFTER
MIRROR LINE

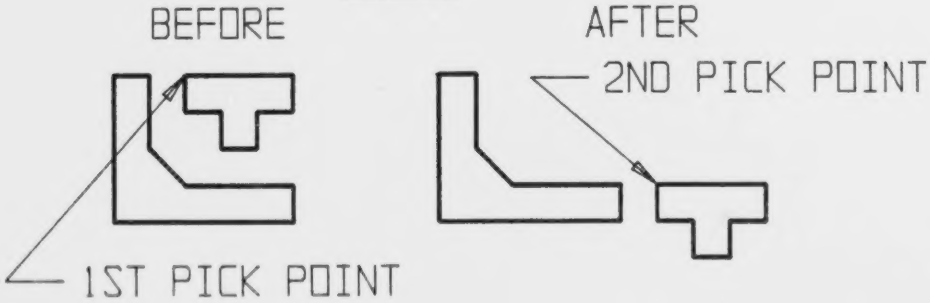

COPY
BEFORE
AFTER 1ST COPY
AFTER 2ND COPY
PICK POINT
1ST PICK POINT
2ND PICK POINT

Editing Entities
(Continued)

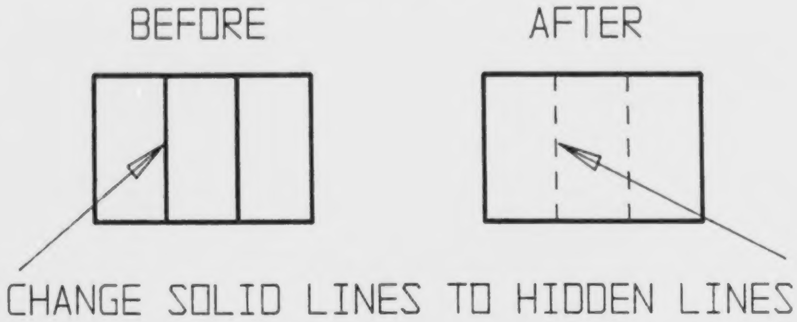
ROTATE


BEFORE
AFTER
CENTER OF ROTATION

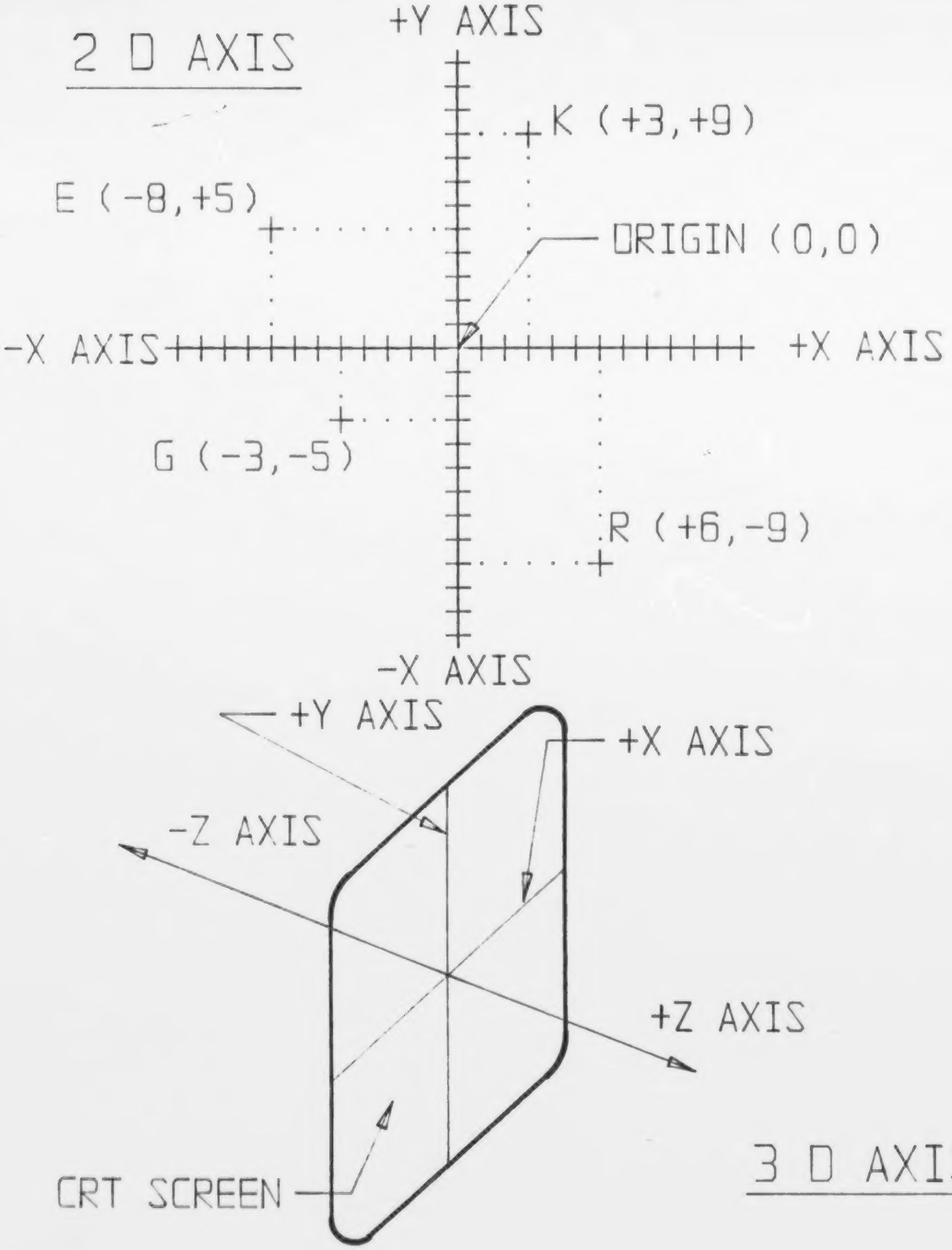
MOVE


BEFORE
AFTER
2ND PICK POINT
1ST PICK POINT

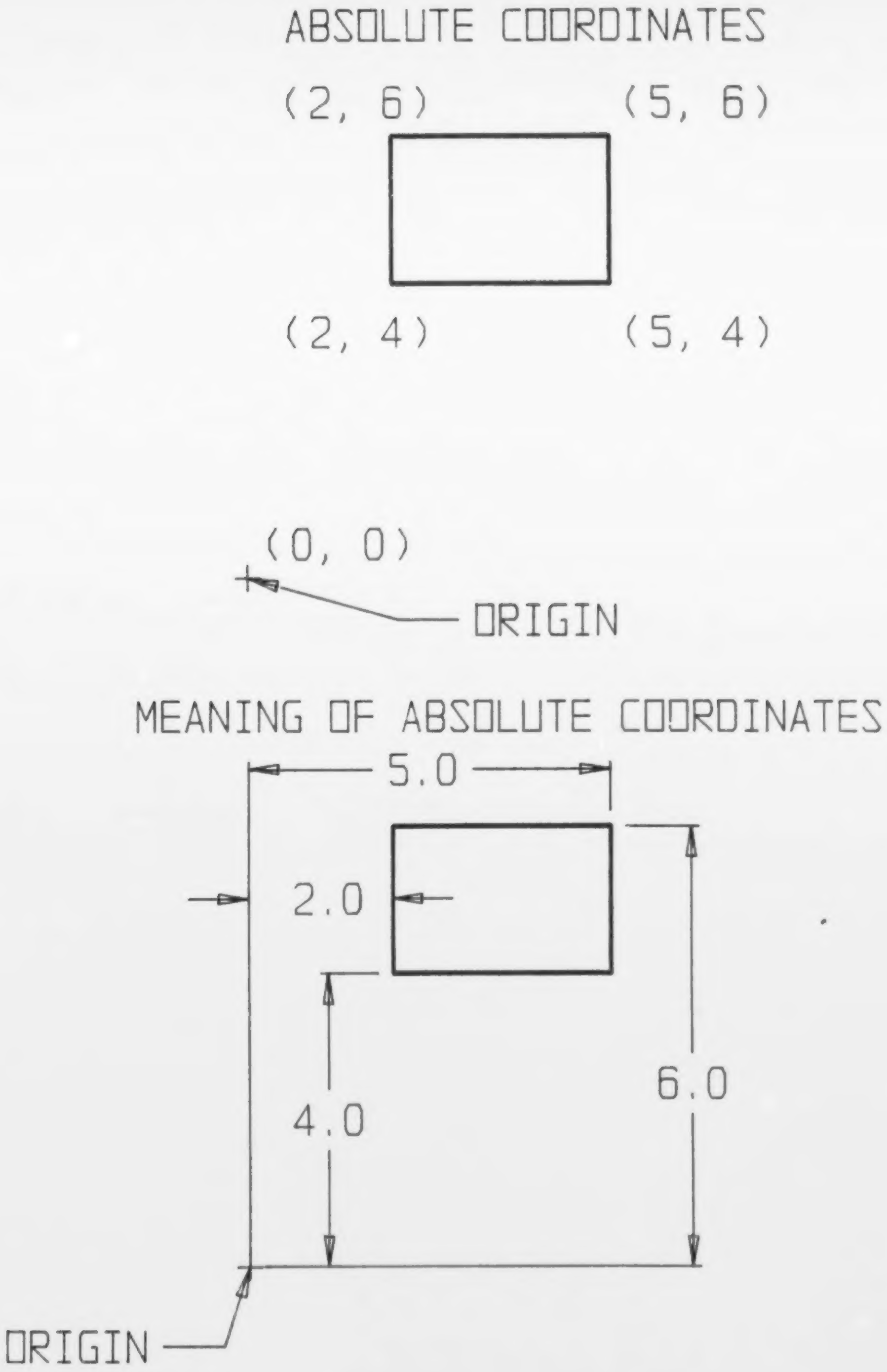
CHANGE


BEFORE
AFTER
CHANGE SOLID LINES TO HIDDEN LINES

Cartesian Coordinate System

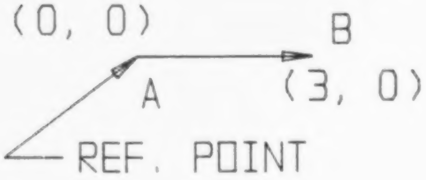

2 D AXIS
+Y AXIS
K (+3,+9)
E (-8,+5)
ORIGIN (0,0)
-X AXIS
+X AXIS
G (-3,-5)
R (+6,-9)
-X AXIS
+Y AXIS
+X AXIS
-Z AXIS
+Z AXIS
CRT SCREEN
3 D AXIS

Absolute Coordinates

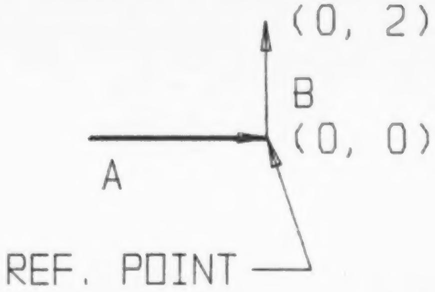

ABSOLUTE COORDINATES
(2, 6)
(5, 6)
(2, 4)
(5, 4)
(0, 0)
ORIGIN
MEANING OF ABSOLUTE COORDINATES
5.0
2.0
4.0
6.0
ORIGIN

Relative Coordinates

REFERENCE POINT A
BECOMES (0, 0)

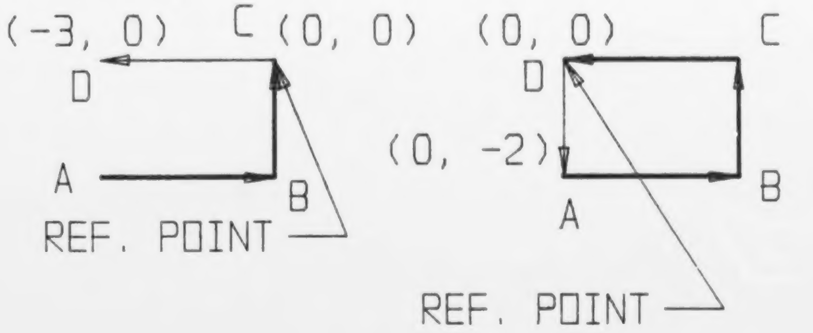

(0, 0)
B
A
(3, 0)
REF. POINT

REFERENCE POINT B
BECOMES (0, 0)

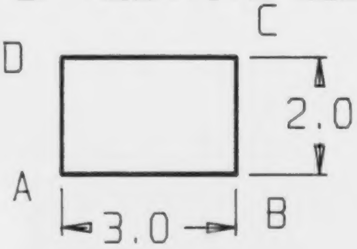

(0, 2)
B
(0, 0)
A
REF. POINT

REFERENCE POINT C
BECOMES (0, 0)

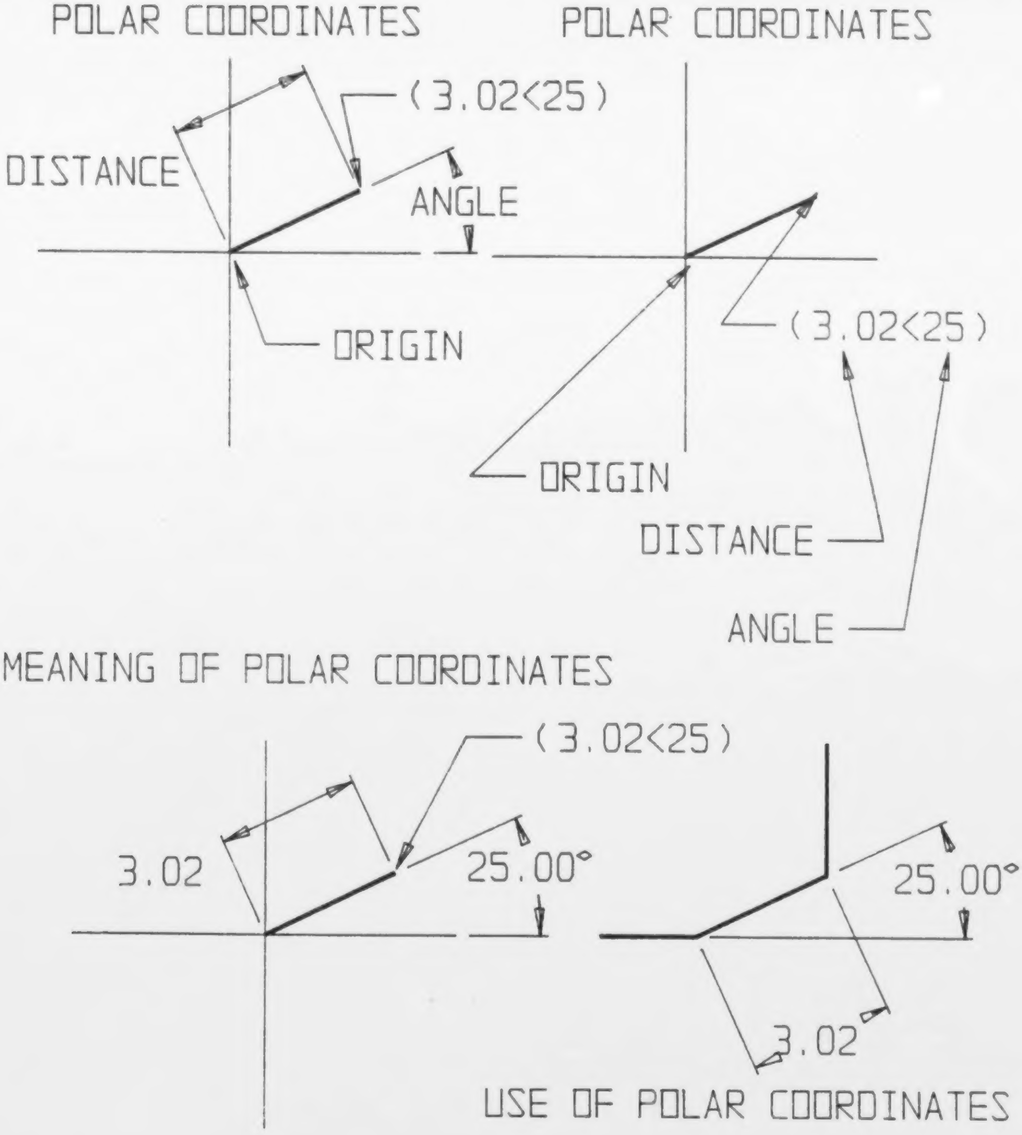
REFERENCE POINT D
BECOMES (0, 0)


(-3, 0)
C (0, 0)
D
A
B
REF. POINT
(0, 0)
C
D
(0, -2)
A
B
REF. POINT

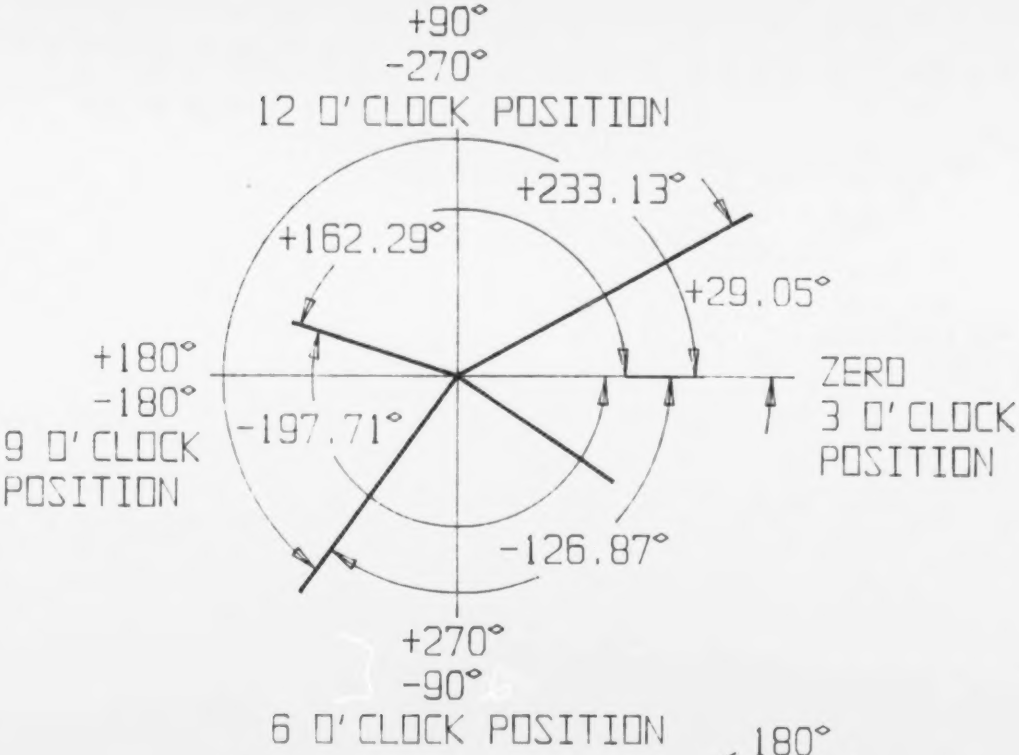
MEANING OF RELATIVE COORDINATES

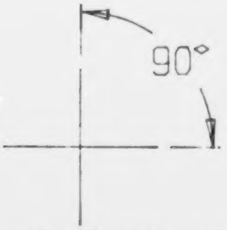


Polar Coordinates

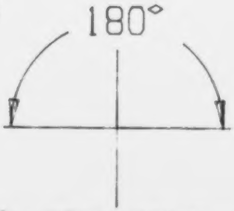

POLAR COORDINATES
DISTANCE
(3.02<25)
ANGLE
ORIGIN
POLAR COORDINATES
(3.02<25)
ORIGIN
DISTANCE
ANGLE
MEANING OF POLAR COORDINATES
(3.02<25)
3.02
25.00°
25.00°
3.02
USE OF POLAR COORDINATES

Reading Angles

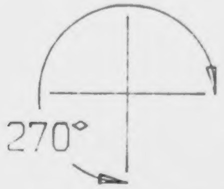

+90°
-270°
12 O'CLOCK POSITION
+233.13°
+162.29°
+29.05°
+180°
-180°
9 O'CLOCK POSITION
ZERO
3 O'CLOCK POSITION
-197.71°
-126.87°
+270°
-90°
6 O'CLOCK POSITION



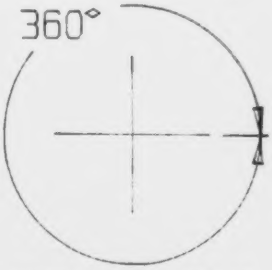
RIGHT ANGLE OR 90° ANGLE



180° STRAIGHT LINE

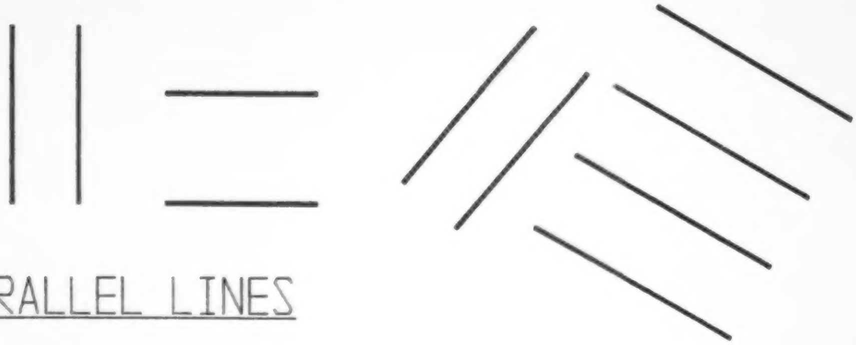


270° ANGLE

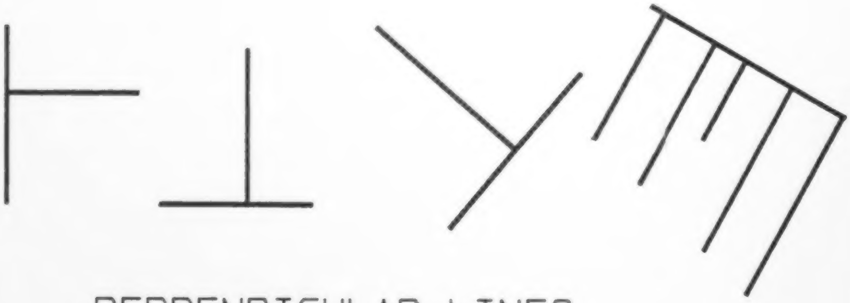


360° CIRCLE

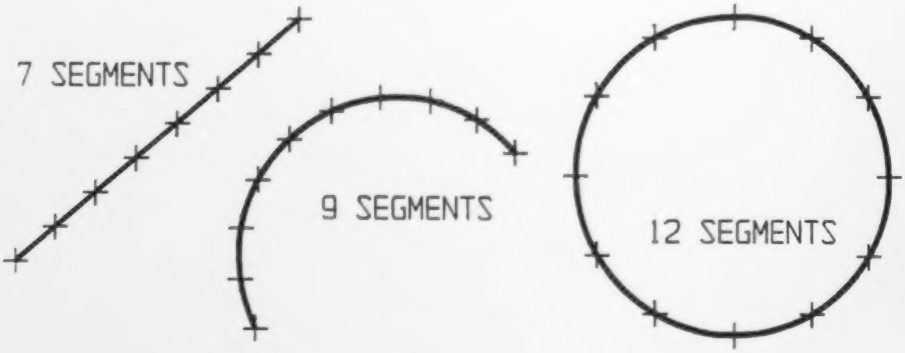
Geometric Contruction Techniques



PARALLEL LINES

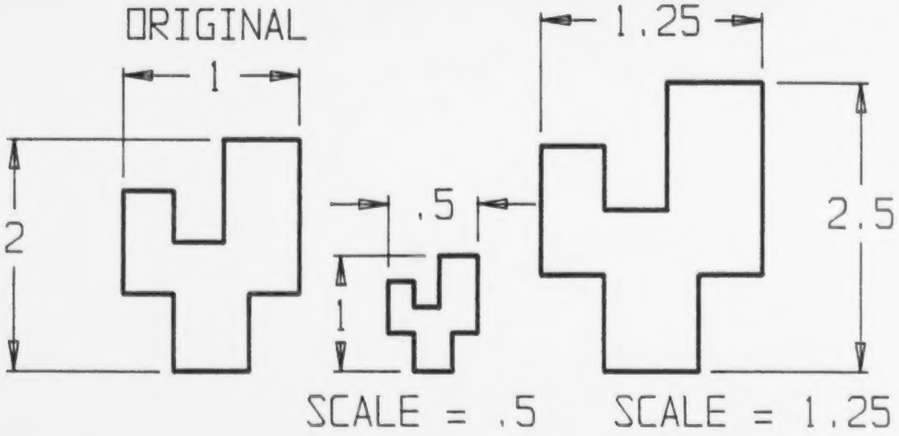


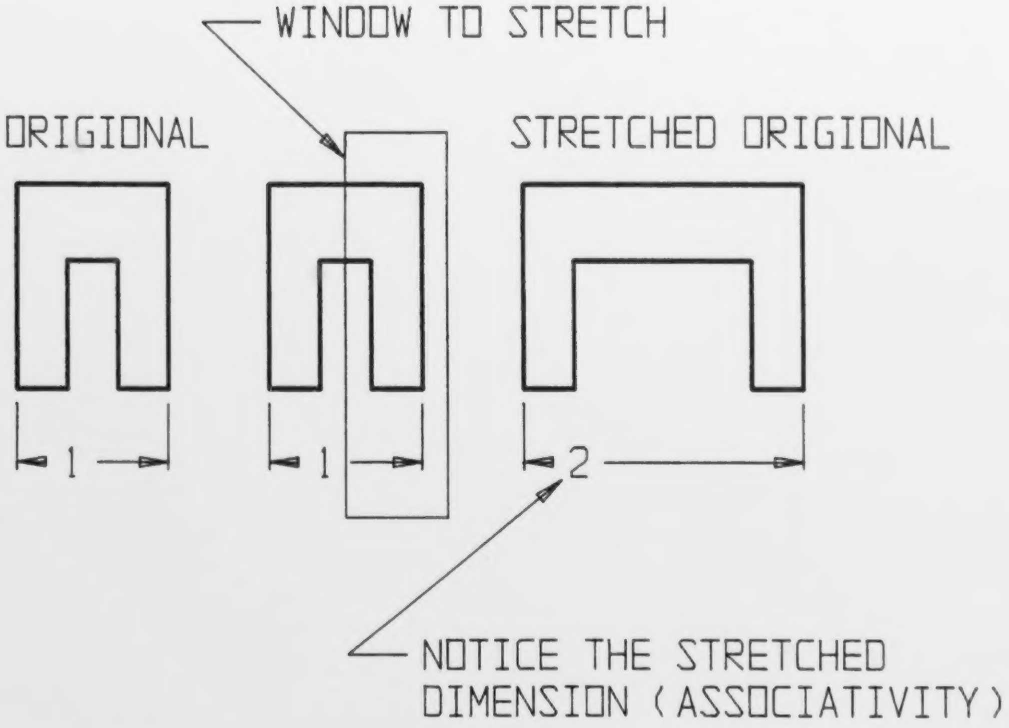
PERPENDICULAR LINES


7 SEGMENTS
9 SEGMENTS
12 SEGMENTS

DIVIDE LINE INTO PARTS

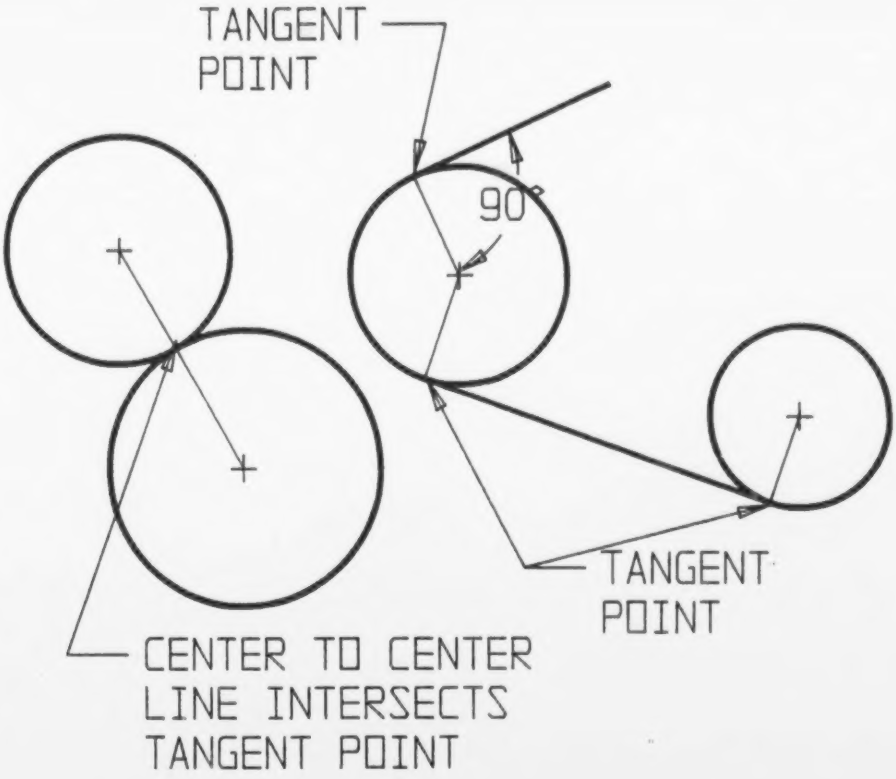
Geometric Contruction Techniques
(Continued)

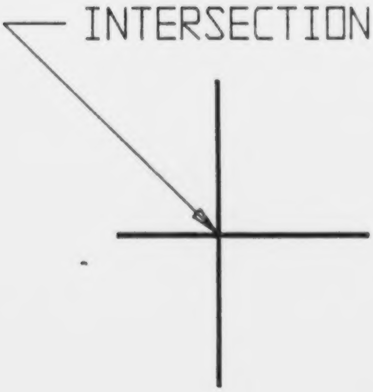

ORIGINAL
1
2
.5
1
1.25
2.5
SCALE = .5
SCALE = 1.25

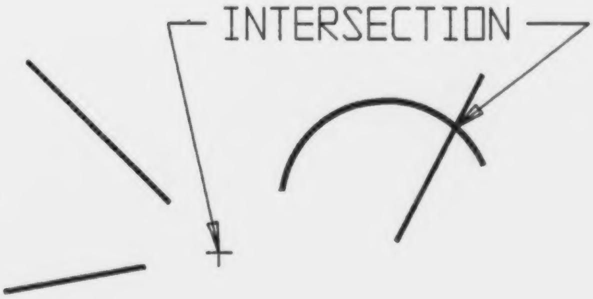

WINDOW TO STRETCH
ORIGIONAL
STRETCHED ORIGIONAL
1
1
2
NOTICE THE STRETCHED
DIMENSION (ASSOCIATIVITY)

Geometric Contruction Techniques

(Continued)


TANGENT
POINT
90°
TANGENT
POINT
CENTER TO CENTER
LINE INTERSECTS
TANGENT POINT


INTERSECTION


INTERSECTION

Basic Geometric Construction
Unit 8

Information Sheet

1. **Terms and definitions**

   a. **Absolute Coordinates** — The X, Y, and Z dimensions of a point in space from absolute zero or the origin

   b. **Attributes** — The color, line type, layer, and width of an entity

   c. **Cartesian or Rectangular Coordinates** — The X, Y, and Z dimensions of a point in space

   d. **Editing** — Changing the attributes of an entity or entities

   e. **Entities** — Elements or primitives of line, text, circle, point, arc, and spline

   f. **Object Snapping** — Positioning of entity exactly on another entity or coordinate point

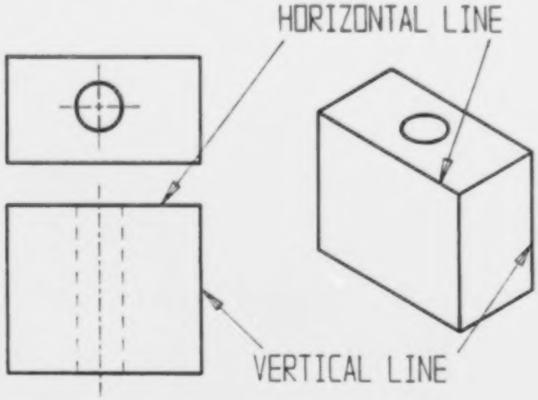
   g. **Polar Coordinates** — The angle and distance from the origin to a point in space

   h. **Relative Coordinates** — The X, Y, and Z dimensions of a point in space from another point in space or the origin

   i. **Reset Origin** — Changing the X, Y, and Z position of the origin with respect to the drawing

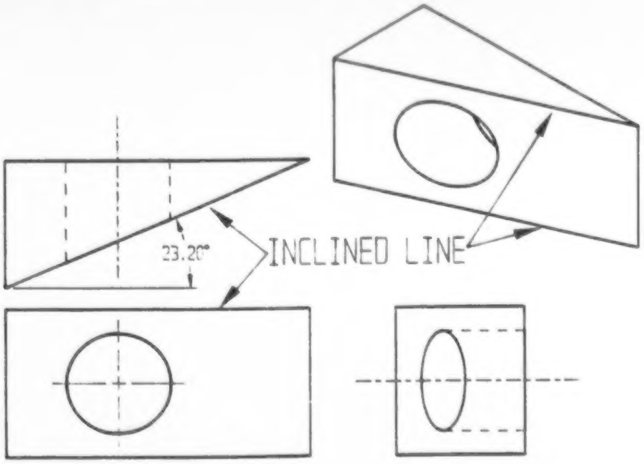
2. **Entities and their applications in geometric construction**

   a. Normal lines are lines drawn both horizontal and vertical.

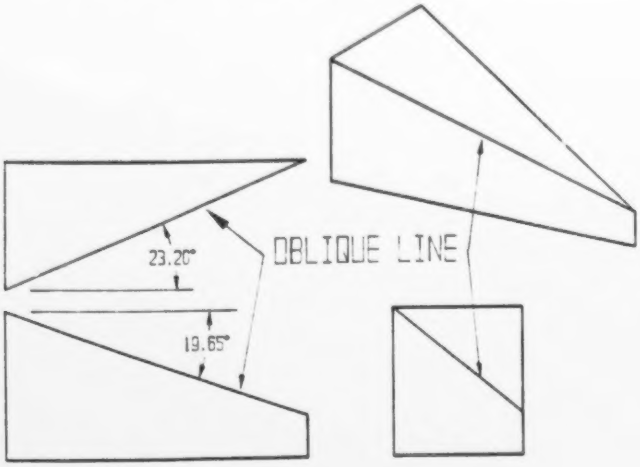


Information Sheet

b. Inclined lines are lines drawn at an angle in one direction.

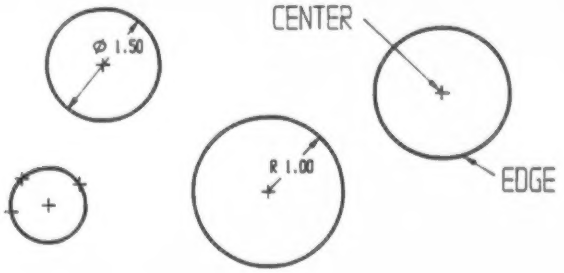

23.20°
INCLINED LINE

c. Oblique lines are lines drawn at an angle in two directions.

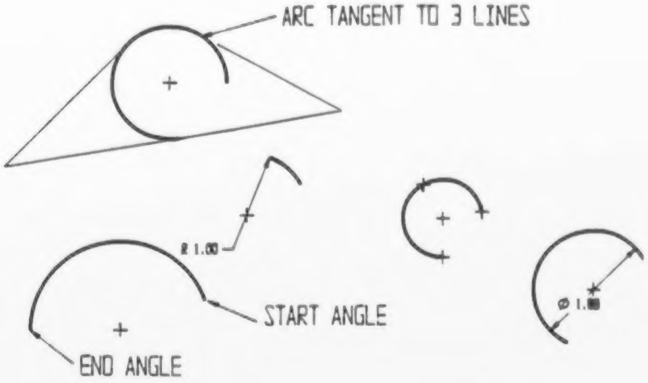

23.20°
19.65°
OBLIQUE LINE

Information Sheet

d. Circles are constructed by their center and diameter, center and radius, center and edge, three points, tangent to three entities.

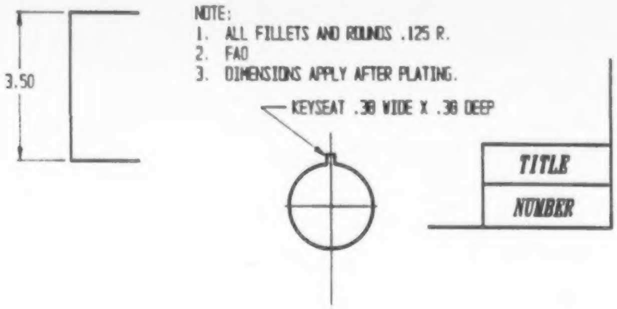

Ø 1.50
CENTER
R 1.00
EDGE

e. Arcs are constructed by center and diameter or radius plus the start angle and end angle; by three points, and numerous other methods.

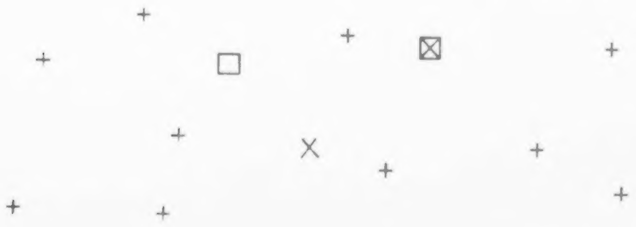

ARC TANGENT TO 3 LINES
R 1.00
START ANGLE
END ANGLE
Ø 1.[illegible]

Information Sheet

f. Text is used for notes, dimensions, leaders with notes and title blocks.

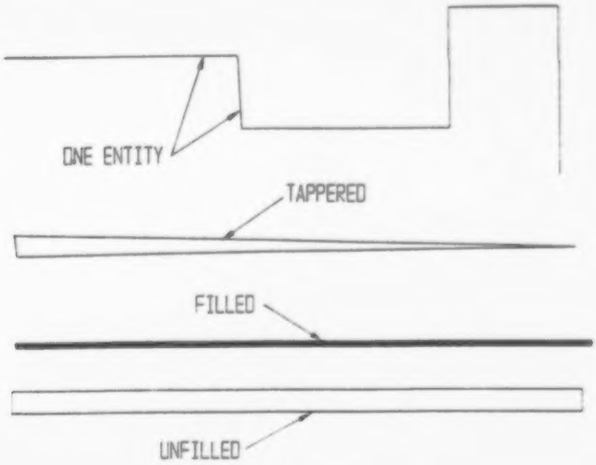

3.50
NOTE:
1. ALL FILLETS AND ROUNDS .125 R.
2. FAO
3. DIMENSIONS APPLY AFTER PLATING.
KEYSEAT .38 WIDE X .38 DEEP
TITLE
NUMBER

g. Points and nodes are used to indicate one x, y, and z coordinate position in space.

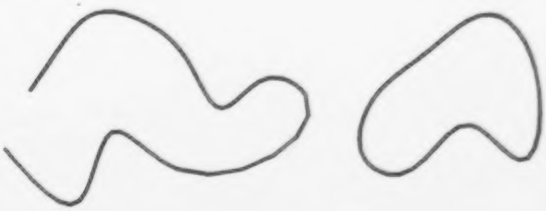


Information Sheet

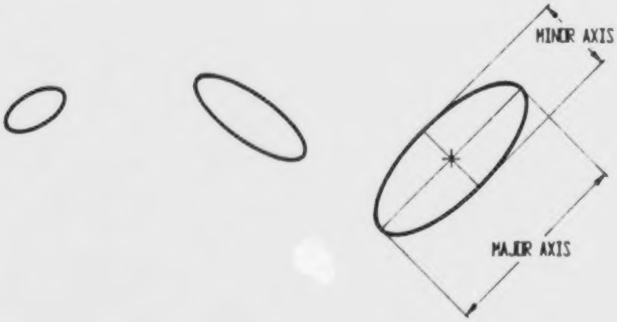
h. Polyline is one entity made up of a complex set of entities which may taper, curve, arc, or appear as a line.


ONE ENTITY
TAPPERED
FILLED
UNFILLED

i. Spline is an irregular curve similar to a French curve.

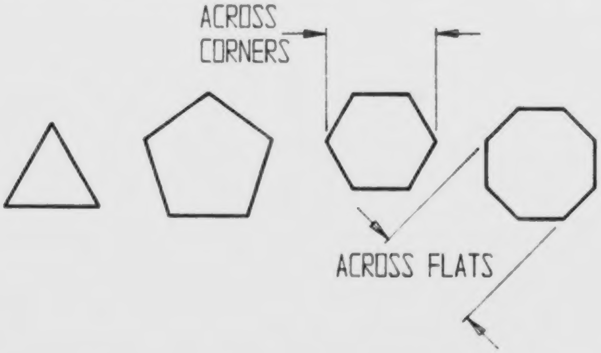


j. Ellipse is a conic oblique section through a cone producing a minor and major axis.


MINOR AXIS
MAJOR AXIS

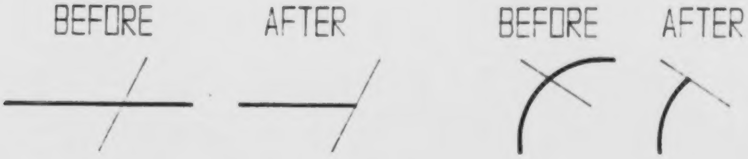
k. Regular polygon is a closed polygon made up of three or more lines of equal length.

Note: Polygons may be filled or unfilled.


ACROSS CORNERS
ACROSS FLATS

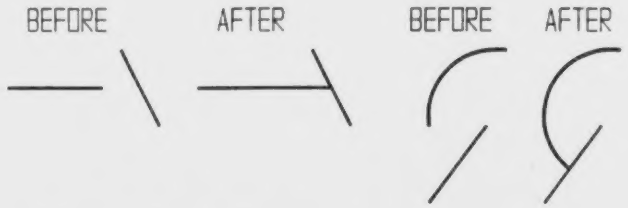
3. Editing entities and their uses in geometric construction

a. **Trim** is used to cut off a line or arc to a shorter length.

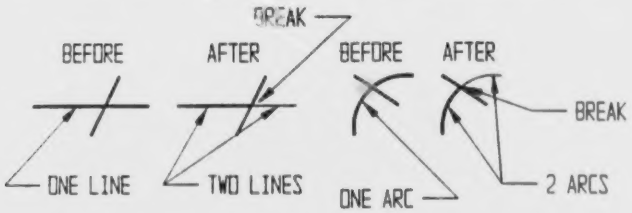

BEFORE
AFTER
BEFORE
AFTER

Information Sheet

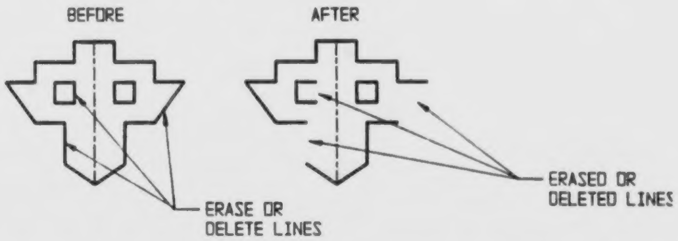
b. **Extend** is used to make a line or arc longer.


BEFORE
AFTER
BEFORE
AFTER

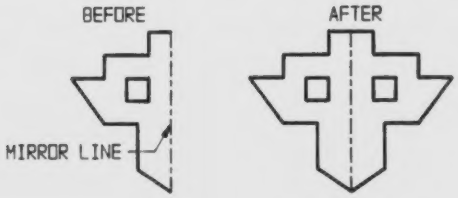
c. **Break** is used to break a line or arc into two or more parts.


BREAK
BEFORE
AFTER
BEFORE
AFTER
BREAK
ONE LINE
TWO LINES
ONE ARC
2 ARCS

d. **Erase** is used to delete an entity from the screen.

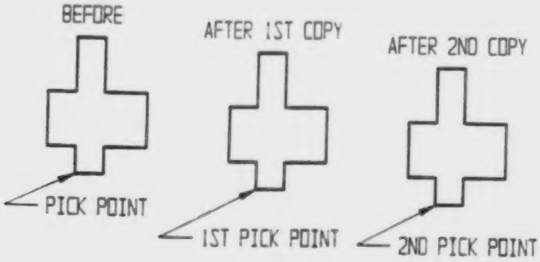

BEFORE
AFTER
ERASE OR
DELETE LINES
ERASED OR
DELETED LINES

e. **Mirror** is used to duplicate an entity or entities about a symmetrical line or mirror line.

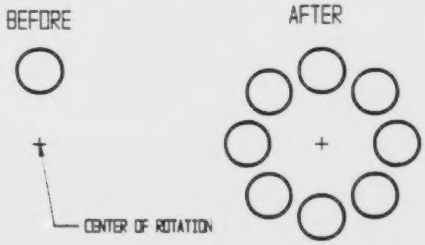

BEFORE
AFTER
MIRROR LINE

Information Sheet

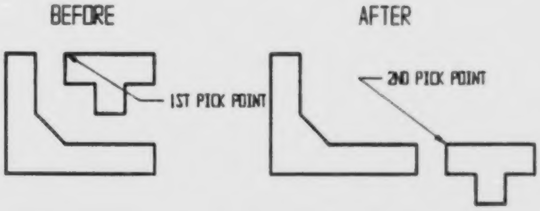
f. **Copy** is used to move an entity or entities to another location on the drawing.


BEFORE
AFTER 1ST COPY
AFTER 2ND COPY
PICK POINT
1ST PICK POINT
2ND PICK POINT

g. **Rotate** is used to duplicate an entity or entities about a center.

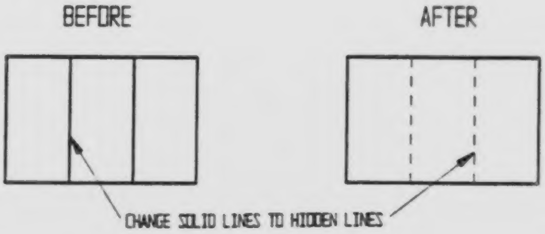

BEFORE
AFTER
CENTER OF ROTATION

h. **Move** is used to move an entity or entities to another part of the drawing area.


BEFORE
AFTER
1ST PICK POINT
2ND PICK POINT

i. **Change** is used to change attributes of entities.

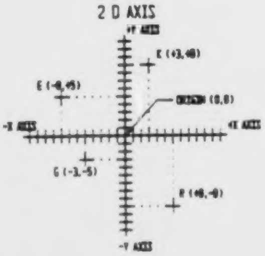
Example: Change color, layer, thickness, type of line, location, and other properties.

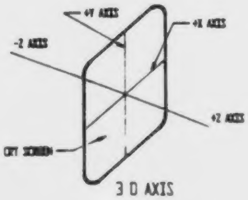

BEFORE
AFTER
CHANGE SOLID LINES TO HIDDEN LINES

Information Sheet

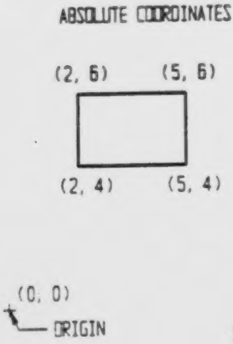
4. Techniques for inputting coordinates

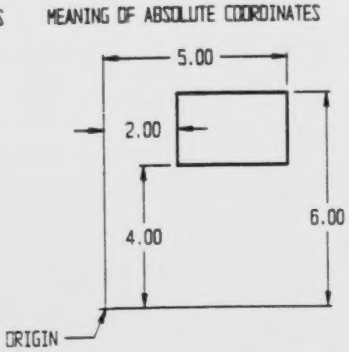
a. Cartesian Coordinates use three mutually perpendicular axis called principal coordinate axes.


2 D AXIS
+Y AXIS
E (+3,+8)
E (-8,+5)
ORIGIN (0,0)
-X AXIS
+X AXIS
G (-3,-5)
F (+8,-8)
-Y AXIS

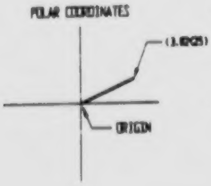

+Y AXIS
+X AXIS
-Z AXIS
+Z AXIS
CRT SCREEN
3 D AXIS

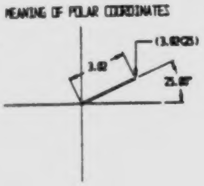
b. Absolute Coordinates means X and Y from the origin (0, 0).

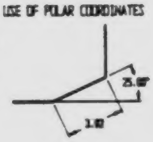

ABSOLUTE COORDINATES
(2, 6)
(5, 6)
(2, 4)
(5, 4)
(0, 0)
ORIGIN


MEANING OF ABSOLUTE COORDINATES
5.00
2.00
4.00
6.00
ORIGIN

c. Polar Coordinates use an angle and a distance to locate a point in space.

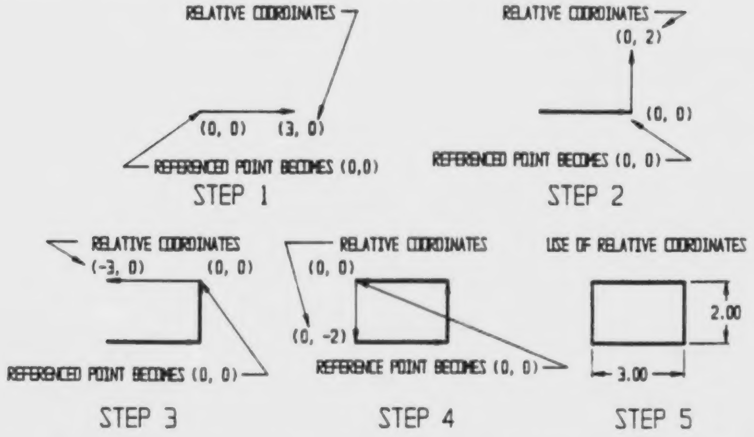

POLAR COORDINATES
(3.02<25)
ORIGIN


MEANING OF POLAR COORDINATES
3.02
(3.02<25)
25.00°

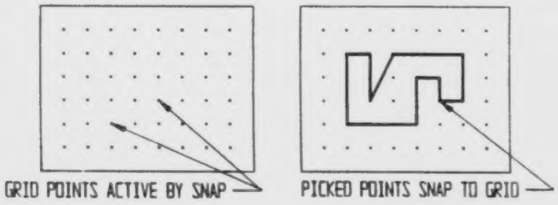

USE OF POLAR COORDINATES
25.00°
3.02

Information Sheet

d. Relative Coordinates are in reference to the last point.

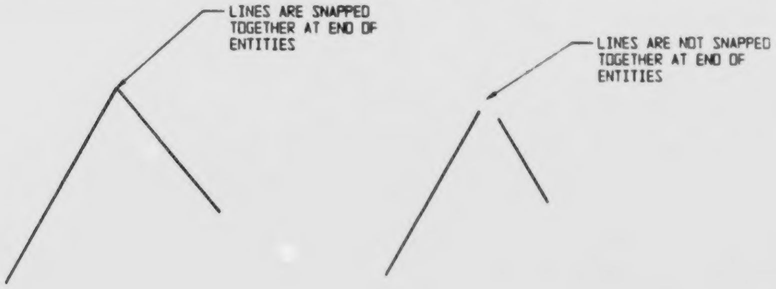

RELATIVE COORDINATES
(0, 0)
(3, 0)
REFERENCED POINT BECOMES (0,0)
STEP 1
RELATIVE COORDINATES
(0, 2)
(0, 0)
REFERENCED POINT BECOMES (0, 0)
STEP 2
RELATIVE COORDINATES
(-3, 0)
(0, 0)
REFERENCED POINT BECOMES (0, 0)
STEP 3
RELATIVE COORDINATES
(0, 0)
(0, -2)
REFERENCE POINT BECOMES (0, 0)
STEP 4
USE OF RELATIVE COORDINATES
2.00
3.00
STEP 5

e. Grid/Snap is used like grid paper in that picked points automatically snap to set intervals.


GRID POINTS ACTIVE BY SNAP
PICKED POINTS SNAP TO GRID

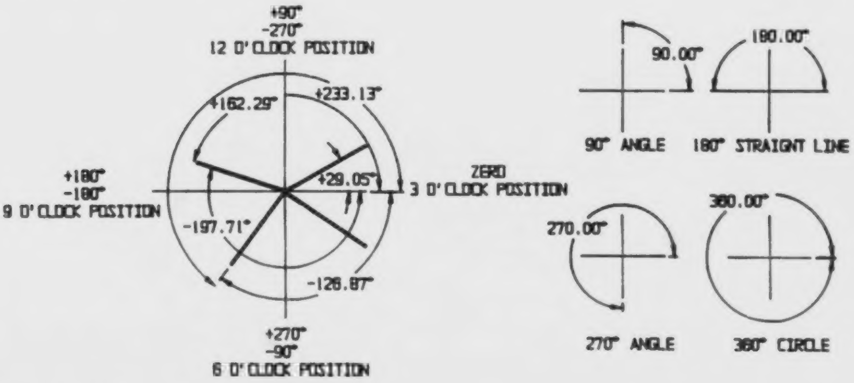
f. Object Snapping means snapping to entities, objects, or position in space.

Note: Object snapping is how we connect exactly one point on top of another point. Without object snapping two intersecting lines may have a gap between them rather than be exactly on top of each other.


LINES ARE SNAPPED TOGETHER AT END OF ENTITIES
LINES ARE NOT SNAPPED TOGETHER AT END OF ENTITIES

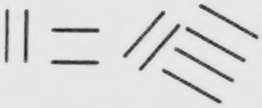
Information Sheet

g. Reading angles are generally measured in a counter clockwise direction starting at the 3 o'clock position.

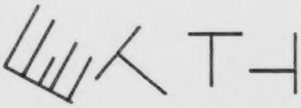

+90°
-270°
12 O'CLOCK POSITION
+162.29°
+233.13°
+180°
-180°
9 O'CLOCK POSITION
+29.05°
ZERO
3 O'CLOCK POSITION
-197.71°
-126.87°
+270°
-90°
6 O'CLOCK POSITION
90.00°
180.00°
90° ANGLE
180° STRAIGHT LINE
270.00°
360.00°
270° ANGLE
360° CIRCLE

5. **Geometric construction techniques**

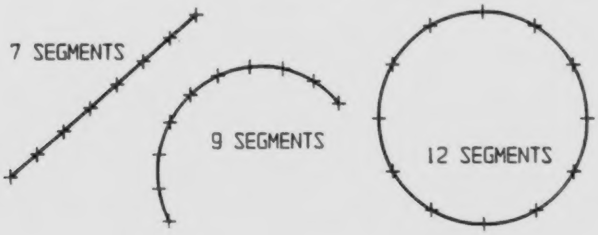
a. Parallel lines are lines equal distance apart.



b. Perpendicular lines are lines at 90 degrees from each other.

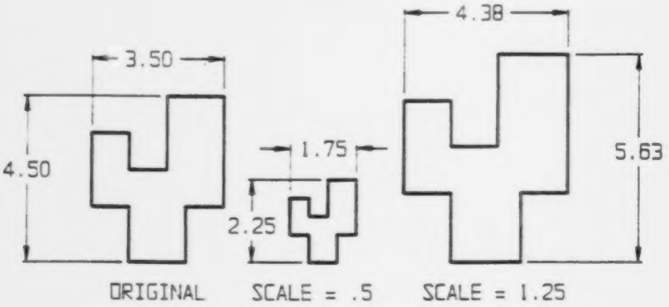


c. Segment lines divide arcs and circles into equal parts with points.

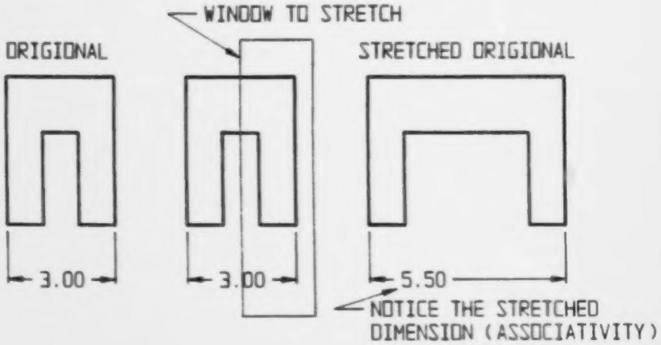

7 SEGMENTS
9 SEGMENTS
12 SEGMENTS

Information Sheet

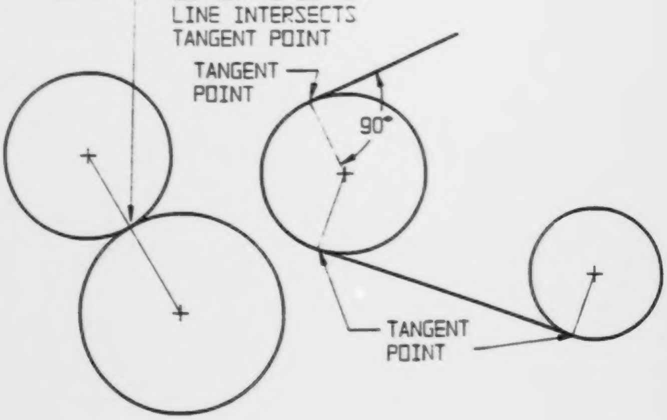
d. Scale is used to enlarge or reduce a part to a new size.


3.50
4.50
1.75
2.25
4.38
5.63
ORIGINAL
SCALE = .5
SCALE = 1.25

e. Stretch is used to lengthen or shorten a part to a new size.

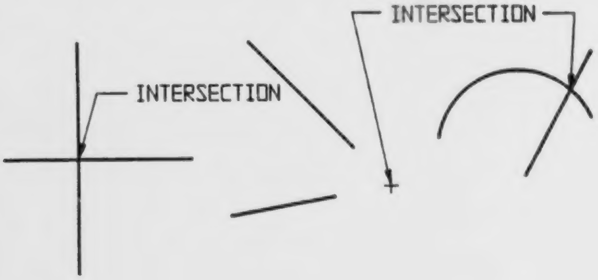

WINDOW TO STRETCH
ORIGIONAL
STRETCHED ORIGIONAL
3.00
3.00
5.50
NOTICE THE STRETCHED
DIMENSION (ASSOCIATIVITY)

f. Tangent to a circle or arc means the tangent line touches one point which is 90 degrees to the radius.


CENTER TO CENTER
LINE INTERSECTS
TANGENT POINT
TANGENT
POINT
90°
TANGENT
POINT

Information Sheet

g. Intersection is the point where two entities cross or project to cross.


INTERSECTION
INTERSECTION

Basic Geometric Construction
Unit 8

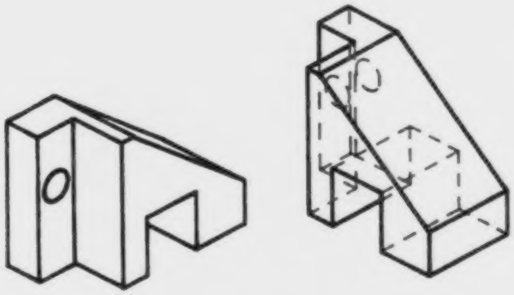
Assignment Sheet 1—Sketch and Dimension Principal Views of a Part

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
Sketched necessary views in correct location	______
Visibility correct on Top View	______
Visibility correct on Front View	______
Visibility correct on Right Side View	______
Views are properly dimensioned	______
Notes and Leaders with notes correct	______

Directions: Turn this page over and use the grid to sketch the views necessary to construct the part shown. Be sure to dimension and place notes required to construct the part.

Assignment Sheet 1



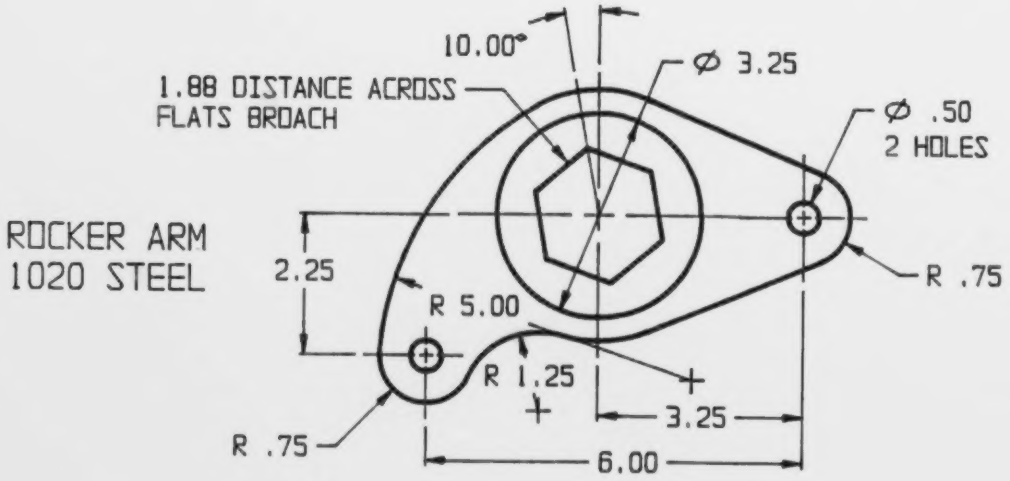
Basic Geometric Construction
Unit 8

Assignment Sheet 2—Draw With Drawing Instruments the Geometric Construction of a Rocker Arm

Name ______________________________ Overall Rating __________

Evaluation criteria	Rating
Geometric Construction correct	______
Tangents correct	______
Center lines correct	______
Center points marked for all arcs and circles	______

Directions: Draw with drawing instruments on vellum the rocker arm shown below. Use a B size sheet of paper. Leave all construction lines. Check tangents for correct tangent points. Draw in center lines and center points of all circles and arcs. Do not dimension unless instructed to do so by your instructor.


10.00°
⌀ 3.25
1.88 DISTANCE ACROSS FLATS BROACH
⌀ .50
2 HOLES
ROCKER ARM
1020 STEEL
2.25
R .75
R 5.00
R 1.25
3.25
R .75
6.00

Basic Geometric Construction

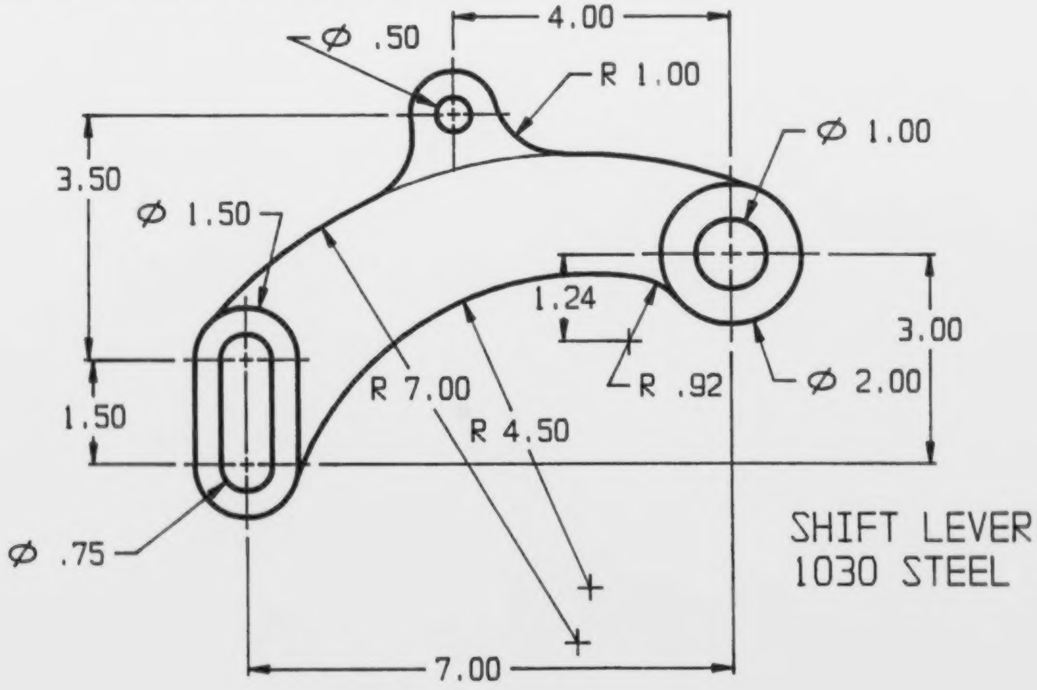
Unit 8

Assignment Sheet 3—Draw With Drawing Instruments the Geometric Construction of a Shift Lever

Name ______________________________ Overall Rating __________

Evaluation criteria	Rating
Geometric Construction correct	______
Tangents correct	______
Center lines correct	______
Center points marked for all arcs and circles	______

Directions: Draw with drawing instruments on vellum the shift lever shown below. Use a B size sheet of paper. Leave all construction lines. Check tangents for correct tangent points. Draw in center lines and center points of all circles and arcs. Do not dimension unless instructed to do so by your instructor.


Ø .50
4.00
R 1.00
Ø 1.00
3.50
Ø 1.50
1.24
3.00
R .92
Ø 2.00
R 7.00
R 4.50
1.50
Ø .75
7.00
SHIFT LEVER
1030 STEEL

Basic Geometric Construction
Unit 8

Assignment Sheet 4—Sketch Selected Entities

Name ____ Overall Rating __________

Evaluation criteria	**Rating**
Geometric Construction correct	______
Entities in correct proportions	______

Directions: Sketch the indicated entities approximating the dimensions indicated.

1. Top and Front view of an inclined line:

2. Top and Front view of an oblique line:

3. .75 diameter circle:

Assignment Sheet 4

4. Text for a note containing the following: Matl is 1020 Steel, All fillets and rounds .25 R, FAO:

5. Radius Arc starting at 120 degrees and ending at 330 degrees with a 1.5″ radius arc:

6. Ellipse with a major dimension of 1.25″ and a minor dimension of .6:

7. Regular polygon with six sides, 1.5″ across flats:

Basic Geometric Construction
Unit 8

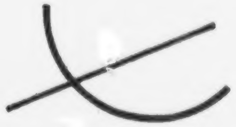
Assignment Sheet 5—Sketch the Editing of Selected Entities

Name ______________________________ Overall Rating __________

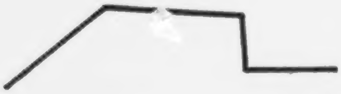
Evaluation criterion	**Rating**
Editing performed correctly	______

Directions: Sketch the editing of entities approximating the dimensions indicated. Mark through entities when they have been deleted.

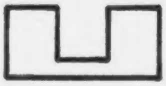
1. Break the line and arc by using a dot to indicate the break.



2. Erase the line. Indicate by marking through the line.

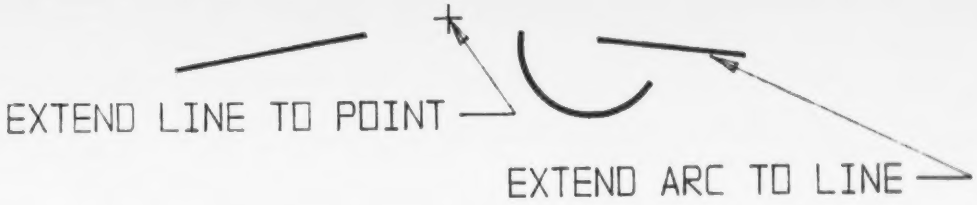


3. Copy the set of entities over to the right side.

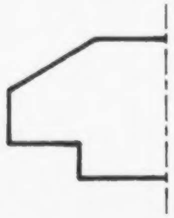


Assignment Sheet 5

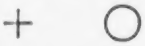
4. Extend the line and arc to the points indicated.


EXTEND LINE TO POINT
EXTEND ARC TO LINE

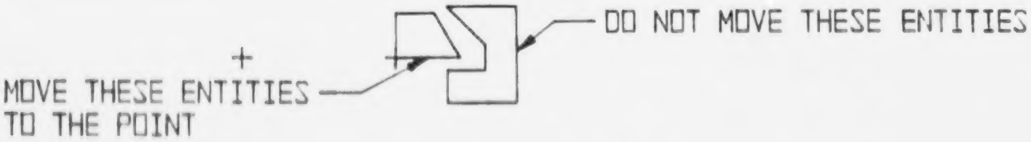
5. Mirror the set of entities about the center line.



6. Rotate the circle five more times about the point.

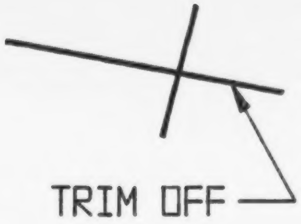


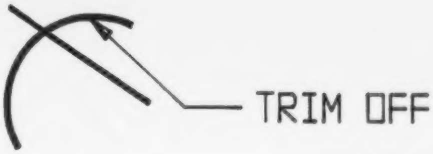
7. Move the set of entities to the left of the entities.


DO NOT MOVE THESE ENTITIES
MOVE THESE ENTITIES
TO THE POINT

Assignment Sheet 5

8. Trim the line and the arc at the points indicated. Indicate by marking through the line.





Basic Geometric Construction
Unit 8

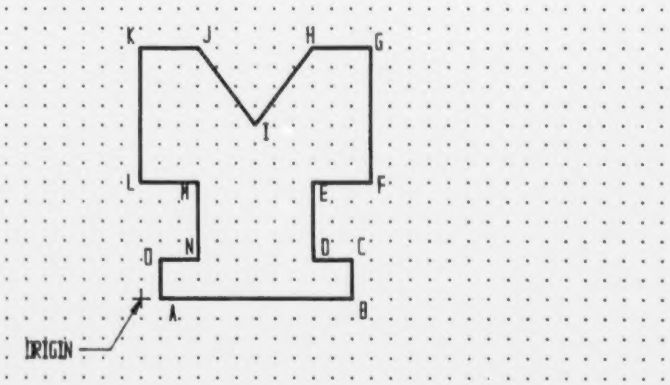
Assignment Sheet 6—Figure the Absolute Coordinates of a V-Block

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
All coordinates are entered	______
Coordinates are correct	______

Directions: Figure the absolute coordinates of the V-Block shown below. Grid = .5.

	X	Y		X	Y
A.	______	______	I.	______	______
B.	______	______	J.	______	______
C.	______	______	K.	______	______
D.	______	______	L.	______	______
E.	______	______	M.	______	______
F.	______	______	N.	______	______
G.	______	______	O.	______	______
H.	______	______			



Basic Geometric Construction
Unit 8

Assignment Sheet 7—Figure the Relative and Polar Coordinates of a Gasket

Name ______________________________ Overall Rating __________

Evaluation criteria	**Rating**
All coordinates are entered	______
Relative Coordinates are correct	______
Polar Coordinates are correct	______

Directions: Figure the relative and polar coordinates of the gasket shown below.

A. ______ ______

B. ______ ______

C. ______ ______

D. ______ ______

E. ______ ______

F. ______ ______

G. ______ ______

H. ______ ______

I. ______ ______

J. ______ ______

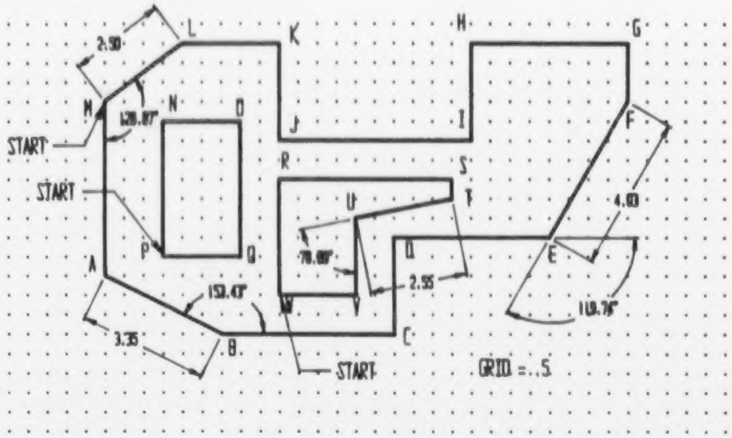
K. ______ ______

L. ______ ______

M. ______ ______

N. ______ ______

O. ______ ______


2.50
L
K
H
G
M
126.87°
N
O
J
I
START
F
R
S
START
U
T
4.03
P
Q
78.69°
D
E
A
2.55
153.43°
W
V
119.74°
3.35
B
C
START
GRID = .5

Assignment Sheet 7

P. ______ ______

Q. ______ ______

R. ______ ______

S. ______ ______

T. ______ ______

U. ______ ______

V. ______ ______

W. ______ ______